

DRAFT Biological Assessment and Essential Fish Habitat Assessment

Green Apple Renewable Fuels Project

Ferndale, Washington
HUC Code: 171100040506

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Summary of Effects Determination

Table E-1. Effects Determination for ESA-Listed Species and Critical Habitats

Species	ESA Status	Effects Determination for Species	Effects Determination for Critical Habitat
Species Under USFWS Jurisdiction			
Bull Trout <i>Salvelinus confluentus</i>	Threatened	May affect, not likely to adversely affect	Designated in Action Area, No Effect
Dolly Varden <i>Salvelinus malma</i>	Proposed (Similarity of Appearance)	Not evaluated	Not applicable, critical habitat is not designated for this species
Oregon Spotted Frog <i>Rana pretiosa</i>	Threatened	No Effect	No effect, not designated in Action Area
Marbled Murrelet <i>Brachyramphus marmoratus</i>	Threatened	May affect, not likely to adversely affect	No effect, not designated in Action Area
Species Under NMFS Jurisdiction			
Chinook Salmon <i>Oncorhynchus tshawytscha</i> Puget Sound ESU	Threatened	May affect, not likely to adversely affect	Designated in Action Area, No Effect
Steelhead <i>Oncorhynchus mykiss</i> Puget Sound DPS	Threatened	May affect, not likely to adversely affect	No effect, not designated in Action Area
Bocaccio <i>Sebastes paucispinis</i> Puget Sound/Georgia Basin DPS	Endangered	May affect, not likely to adversely affect	Designated in Action Area, No Effect
Yelloweye Rockfish <i>Sebastes ruberrimus</i> Puget Sound/Georgia Basin DPS	Threatened	May affect, not likely to adversely affect	Designated in Action Area, No Effect
North American Green Sturgeon <i>Acipenser medirostris</i> Southern DPS	Threatened	May affect, not likely to adversely affect	No effect, not designated in Action Area
Pacific Eulachon (Columbia River Smelt) <i>Thaleichthys pacificus</i> Southern DPS	Threatened	May affect, not likely to adversely affect	No effect, not designated in Action Area
Humpback Whale <i>Megaptera novaeangliae</i>		May affect, not likely to adversely affect	Not applicable, critical habitat is not designated for this species
Mexico DPS Central America DPS	Threatened Endangered		

Killer Whale <i>Orcinus orca</i> Southern Resident DPS	Endangered	May affect, not likely to adversely affect	Designated in Action Area, No Effect
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Key: ESA = Endangered Species Act; ESU = Evolutionarily Significant Unit; DPS = Distinct Population Segment; NMFS = National Marine Fisheries Service; USFWS = U.S. Fish and Wildlife Service

Table E-2. Effects Determination for Essential Fish Habitat

Essential Fish Habitat Designation	Species or Resource in Essential Fish Habitat	Determination
Pacific Coast Salmon EFH	Puget Sound Chinook, Puget Sound coho, Puget Sound pink salmon	Will not adversely affect
Coastal Pelagic Species EFH	Jack mackerel, Pacific (chub) mackerel, Pacific sardine, northern anchovy, and market squid	Will not adversely affect
Pacific Coast Groundfish EFH	Some example species identified as having EFH designated in the vicinity of the Strait of Georgia are rockfish species, flatfish species, sharks, and lingcod.	Will not adversely affect

Key: EFH = Essential Fish Habitat

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Appendix A. Species Lists

- USFWS IPAC ESA List (unofficial)
- NMFS ESA-Listed West Coast Salmon and Steelhead
- NMFS Other ESA-Listed Species
- NMFS ESA-Listed Marine Mammals

Acronyms and Abbreviations

Acronym/Abbreviation	Definition
API	American Petroleum Institute
BA	biological assessment
bbbl	barrel
BMP	best management practice
CARB	California Air Resources Board
CFR	Code of Federal Regulations
CNG	Cascade Natural Gas
CO	carbon monoxide
dB	decibel
dba	A-weighted decibel
dB re 1 μ Pa	Decibels referenced to 1 micropascal
dBrms	decibel root mean square
DO	dissolved oxygen
DPS	distinct population segment
Ecology	Washington Department of Ecology
EFH	Essential Fish Habitat
ESA	Endangered Species Act
ESU	evolutionarily significant unit
FMP	Fishery Management Plan
FOG	fats, oils, and greases
FR	Federal Register
GHG	greenhouse gas
Green Apple Project	Green Apple Renewable Fuels Project
REET	Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation
GRP	Geographic Response Plan
HAPC	Habitat Areas of Particular Concern
HB	House Bill
HUC	Hydrologic Unit Code
Hz	Hertz
IPaC	Information, Planning, and Conservation
ICP	Integrated Contingency Plan
kbbl	kilobarrel
kHz	kilohertz
MDEA	methyldiethanolamine
MHHW	Mean Higher High Water
MLLW	Mean Lower Low Water
Magnuson-Stevens Act	Magnuson-Stevens Fishery Conservation and Management Act
NMFS	National Marine Fisheries Service
NOx	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
PCE	primary constituent element
PFMC	Pacific Fishery Management Council
psig	pounds per square inch gauge

Acronym/Abbreviation	Definition
PM	particulate matter
PUD	Public Utility District
PSCAA	Puget Sound Clean Air Agency
PVC	percentage volume contour
RCW	Revised Code of Washington
SO ₂	sulfur dioxide
SPCC	Spill Prevention Control and Countermeasure
SWMMWW	Stormwater Management Manual for Western Washington
SWPPP	Stormwater Pollution Prevention Plan
ULSD	ultra-low sulfur petroleum diesel
USACE	U.S. Army Corps of Engineers
U.S.C.	United States Code
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WRIA	Water Resource Inventory Area
WSDOT	Washington State Department of Transportation
WSMC	Washington State Maritime Cooperative
WWTP	wastewater treatment plant

1. Introduction

Green Apple Renewable Fuels, LLC (Green Apple) plans to construct the Green Apple Renewable Fuels Project (“Green Apple Project” or “the project”) adjacent to the Phillips 66 Ferndale Refinery site in Ferndale, Washington, which is located along the Strait of Georgia between Cherry Point and Sandy Point (Figure 1).

The project would entail construction of a manufacturing facility designed to process renewable fats, renewable oils, and renewable greases (FOG) feedstocks of varying grades, comprised of used cooking oil, vegetable oils, and animal fats, to produce renewable diesel fuel. Green Apple would receive renewable FOG feedstocks via truck, rail, and water. The facility would be a stand-alone design but would be located adjacent to the Phillips 66 Ferndale Refinery. Green Apple would utilize existing infrastructure within parts of the refinery to supply utilities and infrastructure, as well as provide waste management and logistics services for receiving renewable feedstocks and renewable product shipment. To operate, the facility would also depend on hydrogen supply from an external source, which would require construction of a hydrogen plant that would be owned and operated by a third party. The Green Apple components (buildings, piping, storage tanks, and roads) would cover approximately 18 acres of developed and undeveloped land within the Phillips 66 Ferndale Refinery property.

Green Apple would primarily produce renewable diesel fuel (with minor co-products of renewable propane, renewable naphtha, and optionally renewable jet fuel). Renewable diesel fuel may be blended up to 100 percent with petroleum diesel for fuel handling and engine performance (it meets the D975 American Society for Testing and Materials Standard for diesel fuel). Renewable diesel has significant environmental benefits and therefore is in high demand to help meet environmental goals for private, local, state, and international fleets.

Green Apple would address federal and state directives to reduce the use of fossil fuels and encourage use of cleaner burning fuels with lower greenhouse gas (GHG) emissions. At the federal level, the Energy Policy Act of 1992 aims to reduce U.S. dependence on petroleum and improve air quality by encouraging the use of alternative fuels through both regulatory and voluntary activities. State laws and incentives for alternative fuels in Washington, Oregon, and California are as follows:

- Washington: Alternative Fuel Use Requirement and Biodiesel Use Requirement for state agencies; Renewable Fuel Standard requiring at least 2 percent of all diesel fuel sold in the state to be biodiesel or renewable diesel; state emission reduction requirements for GHG emissions. The Washington Legislature is actively pursuing a Clean Fuel Standard. House Bill (HB) 1110 was approved in 2019 by the full Washington House of Representatives and is still eligible for the 2020 session. Additionally, the Puget Sound Clean Air Agency (PSCAA) is proposing a regional Clean Fuel Standard for King, Kitsap, Pierce, and Snohomish counties. These four counties are home to more than 4.1 million people, over half the state’s population.
- Oregon: Clean Fuel Program; Renewable Fuels Mandate requiring all diesel fuel sold in the state to be blended with at least 5 percent biodiesel.
- California: Low Carbon Fuel Standard Program; State Agency Low Carbon Fuel Use Requirement for transportation fuel purchased by state government.

The Green Apple Project would in no way increase the currently permitted annual crude throughput of the existing Phillips 66 Ferndale Refinery. As stated above, the sole purpose of the Green Apple Project is to construct a new facility that would process renewable FOG feedstocks to produce renewable fuels. The project does not include new or expanded facilities that would facilitate increased shipment of petroleum feedstocks or processing of fossil fuels at Cherry Point.

Environmental benefits of renewable diesel compared to petroleum derived ultra-low sulfur diesel (ULSD) include the following:

- Up to 80 percent reduction in life-cycle GHG emissions based on California Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (GREET) model used for California Air Resources Board (CARB) Low Carbon Fuel Standard
- Up to 40 percent reduction in particulate matter (PM) emissions

- Up to 25 percent reduction in carbon monoxide (CO) emissions
- Up to 15 percent reduction in nitrogen oxides (NOx) emissions
- Up to 12 percent reduction in total hydrocarbon emissions
- Negligible level of sulfur and therefore sulfur dioxide (SO₂) emissions
- Negligible level of aromatic and poly-aromatic compounds (e.g., benzene)

Note that the above emission estimates are derived from data for a 2006 Cummins ISM 370 on Federal Test Procedure driving cycle, as reported in Durbin et al. (2011). Comparisons with Federal ULSD were conducted based on a linear comparison with CARB ULSD data.

Several future additions are also under consideration, including potential future additions related to tank storage and shipment methods of renewable feedstock and renewable products as the markets for these products (such as renewable jet fuel) mature. Separate permit applications would be submitted if the additions are deemed warranted.

The Endangered Species Act (ESA) of 1973 (16 United States Code [U.S.C.] 1531 *et seq.*), as amended, established a national program for conserving threatened and endangered species of fish, wildlife, plants, and the habitat on which they depend. Section 7 of the ESA requires federal agencies, in this case the U.S. Army Corps of Engineers (USACE), to consult with the National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS) (collectively “the Services”), as appropriate, regarding species protected under the ESA.

The purpose of the consultation with the Services is to ensure that the proposed action is not likely to jeopardize the continued existence of species listed as threatened, endangered, or proposed to be listed, or result in the destruction or adverse modification of designated or proposed critical habitat. This Biological Assessment (BA) has been prepared to facilitate the consultation process and support federal Clean Water Act permitting compliance.

This BA also includes an Essential Fish Habitat (EFH) Assessment that evaluates potential effects on EFH as defined by the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) as amended by the Sustainable Fisheries Act of 1996 (16 U.S.C. 1801 *et seq.*).

1.1 Project Location

The Green Apple Project would be constructed adjacent to the existing Phillips 66 Ferndale Refinery site, which is located on the Strait of Georgia in Ferndale, Washington (Figure 2).

- Street Address: 3901 Unick Road, Ferndale, Washington 98248
- Legal Description: Township 39 North, Range 1 East, Sections 32 and 33
- Latitude/Longitude (Approximate center of refinery): 48.8295, -122.6940
- Water Resource Inventory Area (WRIA): 1 – Nooksack
- 6th field Hydrologic Unit Codes (HUC): 171100040506 (Nooksack River-Frontal Bellingham Bay)

1.2 Consultation History

Green Apple Renewable Fuels, LLC, has participated in initial discussions regarding the Green Apple Project with local, state, and federal agencies:

- March 5, 2019, meeting with the Whatcom County Planning and Development Department
- April 15, 2019, meeting with the USACE and Washington State Department of Ecology (Ecology)
- June 13, 2019, pre-application meeting with Whatcom County; Ecology, Washington State Department of Natural Resources, and Northwest Clean Air Agency also in attendance

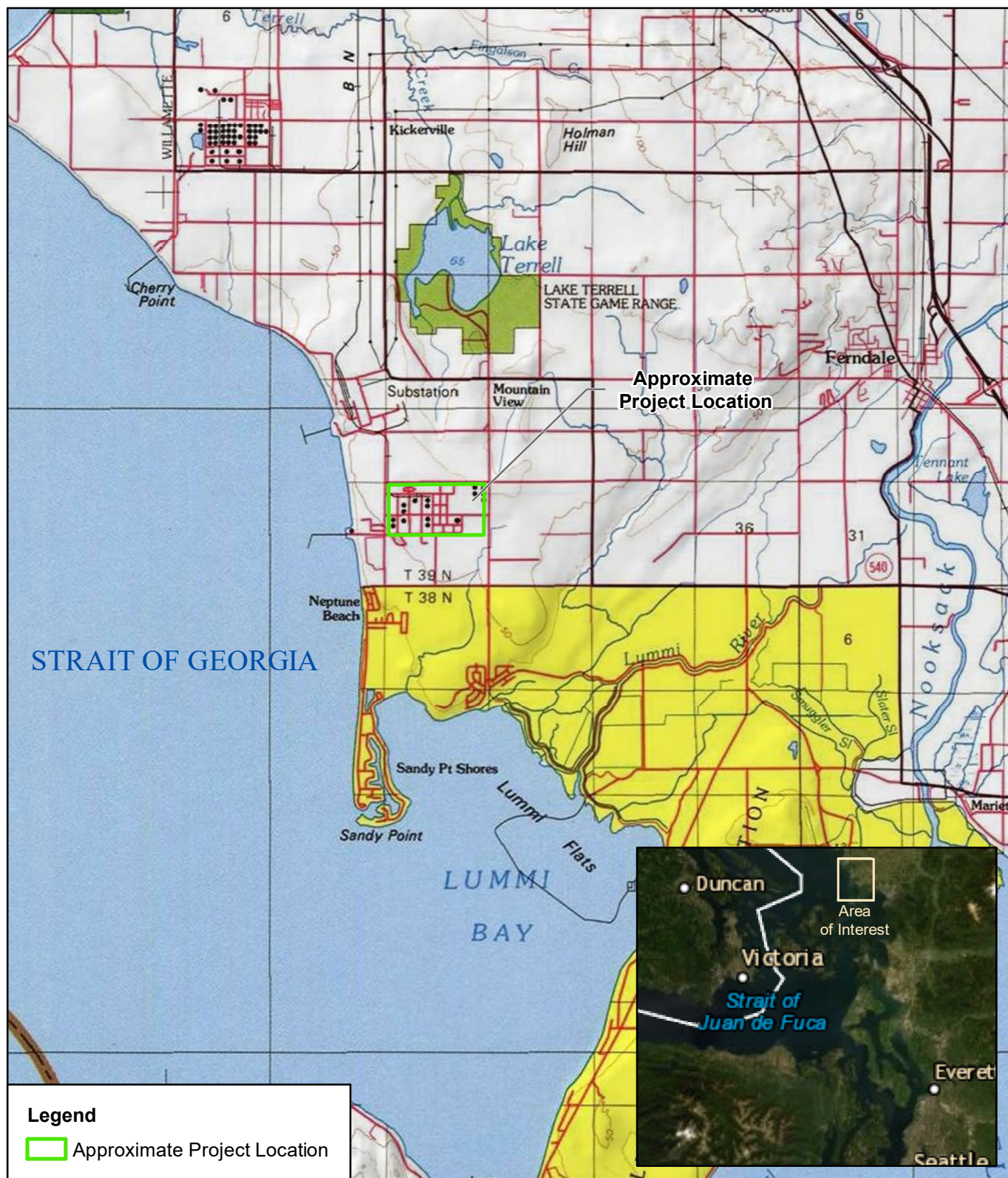
2. Project Description

2.1 Project Overview

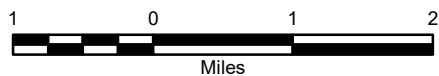
The Green Apple Project would utilize a variety of renewable FOG feedstocks to produce renewable diesel. The FOG would be delivered to the refinery by marine vessel, rail, and truck. The facility would be located adjacent to the Phillips 66 Ferndale Refinery and utilize parts of the existing refinery for utilities, waste management, and logistics for receipt of renewable feedstock and shipment of refined renewable products. Finished product would be primarily shipped to customers on the North American West Coast using marine vessel, rail, and truck. New piping and pumps would be required in association with receiving or shipping materials.

The main project elements include the following:

- A new renewable fuel production facility.
- A new on-site hydrogen plant, adjacent to the renewable diesel production facility, which would be operated by a third party.
- A new gated entrance to the renewable fuel production facility off Lake Terrell Road and a new paved road leading to the processing facility.
- Additions and modifications to the Phillip 66 Ferndale Refinery's existing rail and truck facilities to support renewable FOG and renewable product logistics. No additions or modifications to the Phillip 66 Ferndale Refinery's existing marine facilities are required to support renewable FOG and renewable diesel product logistics.
- New, separate renewable FOG and renewable product storage tanks, to be located in various existing tank containment areas within the refinery.
- New renewable FOG and renewable product internal pipelines or tie-ins between existing pipelines to carry feedstock and production materials (renewable diesel, renewable propane, renewable jet fuel, and renewable naphtha). Renewable feedstocks and renewable fuels would be kept separate from fossil fuels materials to ensure compliance with renewable fuel programs that incentivize use of renewable products.
- Whatcom County Public Utility District (PUD) No. 1 electrical substation upgrades.
- Note: Currently, 99 percent of PUD electricity mix is supplied by low carbon energy sources. Whatcom PUD purchases 100 percent of its power supply from the Bonneville Power Administration and files their power supply fuel mix annually with the State of Washington Department of Commerce. Nearly 90 percent of the PUD's supply is from hydro generation with an additional small amount of biomass energy. Therefore, the current supply is dominated by low carbon, renewable energy sources. Green Apple is in the process of securing power for the facility and is working toward securing low carbon power. Using low carbon electricity is economically incentivized by the CalGreet model CI scoring. Conservatively, the project GREET model utilizes the Northwest U.S. regional electricity generation mix (Region 4).
- Cascade Natural Gas upgrades to natural gas supply.



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VICINITY MAP

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GREEN APPLE RENEWABLE FUELS PROJECT
FERNDAL, WASHINGTON

FIGURE 1



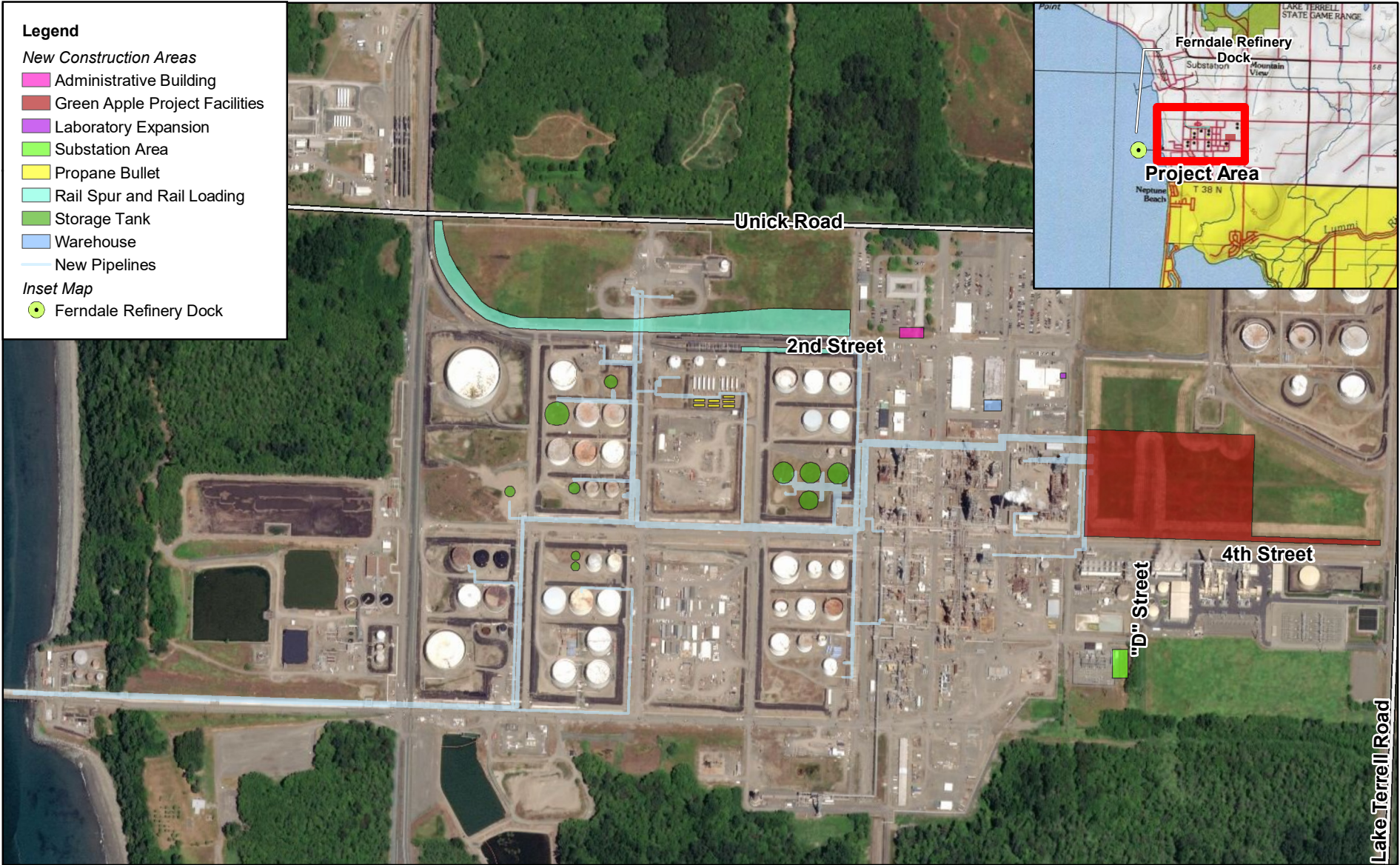
Legend

New Construction Areas

- Administrative Building
- Green Apple Project Facilities
- Laboratory Expansion
- Substation Area
- Propane Bullet
- Rail Spur and Rail Loading
- Storage Tank
- Warehouse
- New Pipelines

Inset Map

- Ferndale Refinery Dock



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Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



PROJECT AREA

GREEN APPLE RENEWABLE FUELS PROJECT
FERNDAL, WASHINGTON

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FIGURE 2

2.2 Description of Project Elements

2.2.1 Project Construction

A variety of new facilities and infrastructure components would need to be constructed in association with the Green Apple Project. These include the processing facilities, a hydrogen plant, substation improvements, new pumps and piping, additional storage tanks, additional rail car capacity, and a new administration building. The estimated temporary construction footprint includes temporary laydown areas for process equipment and bulk material storage/vendor areas (300,000-square-feet), construction trailers/contractor field offices and facilities (150,000-square-feet), and parking (200,000-square-feet).

2.2.1.1 New Buildings

The majority of the project's processing equipment would be located outdoors, with the exception of FOG pre-treatment equipment. Laboratory and maintenance space required by the project would be provided by the refinery's existing facilities. New buildings that would be constructed as part of the proposed project include the following:

- A 24,000-square-foot addition to the administration building
- A 6,000-square-foot addition to an existing warehouse
- Potentially a 1,200-square-foot addition to the existing laboratory
- A 7,500-square-foot Power Distribution Center
- A 1,200-square-foot field operating shelter
- A 9,000-square-foot FOG pretreatment building
- Security fencing separating the renewable fuels production facility from the refinery

2.2.1.2 New Loading/Unloading Facilities

The Green Apple Project would use a combination of existing and new facilities to facilitate receiving feedstocks and shipping refined products out of the refinery via marine vessels, rail, and truck (see Figure 2):

- Receiving feedstocks via marine vessels – Water-borne feedstock would be received at the Ferndale Refinery dock and would use an existing pipeline from the dock to new renewable feedstocks tanks connected to the new renewable diesel plant. No modifications to the existing dock are required. No piping modifications are required within 200 feet of the shoreline. New piping would be added between the existing pipeline and the new renewable feedstock storage tanks on land. All new “transfer pipelines” (as defined by Washington Administrative Code [WAC] 173-180-025[40]) would be designed and constructed in accordance with WAC 173-180-340 and would be equipped with an emergency shut down system designed and operated in accordance with WAC 173-180-250. All “transfer pipelines” would be routinely inspected, maintained, and repaired in accordance with American Petroleum Institute (API) 570. The vessel delivering the feedstock would provide the pump for unloading the material.
- Receiving feedstocks via rail – Feedstock rail receiving facilities would be located adjacent to the existing rail facility on the northwest side of the P66 Ferndale Refinery. The new renewable feedstock unloading infrastructure would consist of approximately 30 rail unloading spots and new unloading pumps. New dedicated renewable feedstock piping would also be required.
- Receiving feedstocks via truck – Renewable feedstock would arrive via cargo ship and then be transported to the facility by truck. A single truck rack renewable feedstock receiving facility would be constructed adjacent to the new renewable diesel production facility. There would also be an adjacent renewable feedstock flexi-bag and iso-container (both of which are containers for shipping bulk liquids via cargo ships) steaming and unloading spot. A new pump would be required.

- Shipping/loading renewable diesel via marine vessel – Renewable diesel would be shipped using existing marine facilities. No new pumps or pipes, or other modifications to the existing dock would be required.
- Shipping/loading renewable diesel via rail – Up to two new renewable diesel rail loading spot and up to four new renewable propane loading spots would be added to the existing product loadout racks in the northwest corner of the Phillips 66 Ferndale Refinery. A new pump would be required (also used for truck loading).
- Shipping/loading renewable diesel and naphtha via truck – Two new renewable diesel truck loading spots would be added to the existing diesel loadout rack in the northwest corner of the Ferndale Refinery. Renewable naphtha would be loaded out over the existing gasoline load-out rack and controlled by the existing incinerator.

2.2.1.3 New Pipelines

As part of the renewable diesel project, new aboveground piping runs would be constructed for renewable diesel product, renewable FOG feedstock, renewable propane, renewable naphtha, and renewable jet fuel (future), as shown on Figure 2.

2.2.1.4 New Utilities

The Green Apple Project would use the following public utilities:

- Natural gas – The renewable fuel production facility would have natural gas supplied from the local utility, Cascade Natural Gas. An aboveground pipeline would be installed from the main Cascade Natural Gas line near the property line to the new renewable diesel processing units.
- Electricity – The renewable fuel production facility would have electricity supplied from the local PUD, featuring redundant transformers and supply connections from both Puget Sound Energy and Bonneville Power Administration. Emergency backup power would be supplied by batteries. The processing facility would have its own Power Distribution Center that would be constructed on-site near the new facility. Low hanging pre-existing electrical power lines parallel to Lake Terrell Road would be relocated to avoid conflicts during construction and operation.
- Raw water – Water from the PUD would supply the renewable fuels production facility. The water would be used to generate steam and for the process. The project would also include construction of a new cooling tower for the production facility. Cooling tower makeup water would come from the raw water supply. Cooling tower blow down would return to the process sewer. New interconnecting lines would be constructed.

The Green Apple Project would use the following utilities supplied by nearby private facilities

- Fuel gas – To maximize the efficiency and reliability of both the Phillips 66 Ferndale Refinery and the renewable fuel production facility, the new Green Apple facility would be connected to the refinery fuel gas system. An aboveground pipeline would be installed from the Phillips 66 Ferndale Refinery to the new renewable fuel production facility.
- Steam – To maximize the efficiency and reliability of both the Phillips 66 Ferndale Refinery and the renewable fuels production facility, the new renewable diesel facility would be connected to the Phillips 66 Ferndale Refinery's steam systems. Steam pipelines would be installed from the Phillips 66 Ferndale Refinery to the new renewable diesel processing units.
- Boiler feed water – To maximize the efficiency and reliability of both the Phillips 66 Ferndale Refinery and the renewable fuels production facility, the new Green Apple facility would be connected to the Phillips 66 Ferndale Refinery boiler feed water system. A new pipeline would connect the Phillips 66 Ferndale Refinery to the new renewable diesel processing units.
- Hydrogen – Hydrogen would be used in the reaction process of the renewable fuels production facility. A third-party hydrogen plant would be constructed as part of the Green Apple Project, with associated interconnecting piping.

- Stormwater and process water sewers – Stormwater from the Green Apple Project site would be routed to the Phillips 66 Ferndale Refinery system. Process sewers would be routed to the Phillips 66 Ferndale Refinery Wastewater Treatment Plant (WWTP). Process sour water generated by the Green Apple Project would be routed to the Phillips 66 Ferndale Refinery sour water treatment facilities. Construction would include interconnecting lines from the new renewable diesel facility to the existing Phillips 66 Ferndale Refinery systems and upgrades to the Phillips 66 Ferndale Refinery sour water treatment facility to accommodate the incremental volume.
- Wastewater – Process contact wastewater is a byproduct of the renewable diesel production process. An anaerobic or aerobic digestion pretreatment facility for this water stream would be constructed. The treated water from the pretreatment facility would be routed to the process sewer in the renewable fuel production facility, where it would be routed to the Phillips 66 Ferndale Refinery WWTP.
- Sanitary sewer – Sanitary waste from the new sources would be routed to the existing Phillips 66 Ferndale Refinery sanitary treatment system. New interconnecting lines would be constructed.
- Potable water – Potable water would be provided by the Phillips 66 Ferndale Refinery potable water system with metering. New interconnecting lines would be constructed.
- Firewater – Firewater would be provided by the Phillips 66 Ferndale Refinery system. The on-site portion of the firewater system would be looped to ensure robust supply if needed. New interconnecting lines would be constructed.
- Plant air and instrument air – Plant and instrument air would be supplied by one or more dedicated compressors on the renewable fuel production facility site. To maximize the efficiency and reliability of both the Phillips 66 Ferndale Refinery and the renewable fuel production facility, the new Green Apple facility would be connected to the refinery air systems. New interconnecting lines would be constructed.
- Flare headers – If a dedicated Green Apple flare is not required, the flare system for the new Green Apple facility would be integrated into the Phillips 66 Ferndale Refinery flare system, with the ability to isolate the new Green Apple facility from the Phillips 66 Ferndale Refinery. A new interconnecting line would be constructed.
- Rich and lean methyl-diethyl amine (MDEA) – The Phillips 66 Ferndale Refinery MDEA system would process the hydrogen sulfide/CO₂-rich off gases produced by the renewable diesel production facility. New interconnecting lines would be constructed.
- Nitrogen – Nitrogen would be provided by the Phillips 66 Ferndale Refinery nitrogen system with metering. Provisions would be made to bring in outside nitrogen for startup, shutdown, and turnaround requirements above normal uses. A new interconnecting line would be constructed.

2.2.1.5 New Storage Tanks

Dedicated tanks would be provided for storing renewable FOG feedstock, renewable diesel, renewable naphtha, renewable propane, and renewable jet fuel (future) products.

All new storage tanks (as defined by WAC 173-180-025[36]) would be designed and constructed in accordance with WAC 173-180-330. All new storage tanks would be equipped with a secondary containment structure designed and constructed in accordance with WAC 173-180-320. All storage tanks would be routinely inspected, maintained, and repaired in accordance with API 653.

Storage tanks associated with the project include the following:

- Raw feed storage (four, approximately 400 kilobarrels [kbbbl] total)
- Feedstock feed (one tank, approximately 25,000 barrels [bbl])
- Treated feed (two tanks, approximately 20,000 bbl each)
- Renewable Diesel storage (three tanks, approximately 300 kbbbl total)
- Renewable naphtha off-spec (one tank, approximately 2,800 bbl working volume, with floating roof)
- Renewable diesel off-spec (one tank, approximately 36,000 bbl working volume)

- Renewable propane (five tanks, approximately 95,000 gallons horizontal each)
- Aqueous waste storage (two tanks, approximately 160,000 gallons each)
- 50 percent citric acid storage (one tank, 40,000 gallons)
- 25 percent sodium hydroxide storage (one tank, 20,000 gallons)
- 100 percent dimethyl disulfide storage (one tank, 10,000 gallons)
- ULSD tank for blending with renewable diesel (one tank, approximately 5,000 gallons)
- A transport company would apply for Whatcom County and Washington State Department of Fish and Wildlife (WDFW) permits for off-loading up to four pieces of large process equipment by barge at the Gulf Road barge landing site. While the transport company would apply for these permits, the activity is included in this BA as an interdependent action.

2.2.2 Project Operation

The renewable fuel production facility would receive shipments of renewable FOG feedstocks and transport renewable fuels products via marine vessel, rail, and truck. New pipeline and pumps may be required in association with receiving or shipping materials. A separate transportation study, developed to investigate the potential effects from increased marine and rail traffic, describes project operations in more detail (ERM 2019).

2.2.2.1 Marine Vessel

Water-borne renewable feedstock arriving at the refinery would be received from an existing dock within the Phillips 66 Ferndale Refinery and would use the existing heavy fuel oil line from the dock. No modifications to the existing dock are required. The facility would utilize the new piping added between existing pipes and storage tanks to transport the renewable FOG stocks to new storage tanks. The pump necessary for this transport would be provided by the vessel delivering the FOG stocks. Shipping of refined renewable fuels product would use tie-ins to existing infrastructure to supply fuels to marine vessels. The largest vessels used to service the facilities are Panamax class vessels (60,000 to 80,000 deadweight and 978,000 bbl cargo capacity), although ocean-going barges (150,000 bbl capacity) and articulated barges (30,000 to 80,000 bbl capacity) would also be used to ship materials to/from the facilities.

In 2018, a total of 49 inbound and 349 outbound vessels delivered and shipped products to the refinery. The Salish Sea accounted for 78 percent of the outbound vessel trips and 58 percent of shipped volume. Under anticipated traffic volumes where shipments are split between rail and vessel traffic, the new facilities would likely generate 143 new vessel movements (including both to and from the refinery) per year, or 0.4 vessel movements per day (ERM 2019).

2.2.2.2 Rail

Operation of the Green Apple Project would increase on-site capacity to heat and unload 30 incoming renewable feedstock rail cars per day. However, it is not anticipated that there would be an increase the number of trains servicing the facilities, as the new tank cars would be added to the ends of existing manifest rail shipments. All renewable diesel, renewable propane, and feedstock transported by rail would be transported via the Burlington Northern Santa Fe rail system.

Under anticipated traffic volumes where shipments are split between rail and vessel traffic, the new facilities would add approximately 55 additional 28,000-gallon standard rail cars to manifest trains per day. It is anticipated that these additional cars would be added to one inbound manifest train and one outbound manifest train per day at the new facilities. It is likely that these additional rail cars would be added to existing manifest trains, which would result in no net increase in the number of inbound or outbound trains at the refinery (ERM 2019). Inbound train cars transporting canola oil would be coming from Alberta, while those transporting beef tallow could originate from anywhere in North America. Shipping of refined renewable fuels product would use tie-ins to existing infrastructure to supply fuels to rail shipments (ERM 2019).

2.2.2.3 Truck

Receiving feedstock and shipping renewable fuels by truck during operation of the Green Apple Project would result in increased vehicular trips by commercial trucks, with a projected average of five loaded trucks per day, assuming 9,000 gallons per truck. Truck traffic associated with other minor chemical deliveries and hauling of waste materials would result in an additional five to six loaded trucks per day on average.

2.3 Interdependent and Interrelated Actions

Interdependent actions are actions having no independent utility apart from the proposed action. Interrelated actions are actions that are part of a larger action and depend on the larger action for their justification (50 Code of Federal Regulations [CFR] 402.02).

2.3.1 Barge Offloading for Oversized Equipment

Barge landings at Gulf Road are proposed to off-load and deliver oversized equipment for the construction of the Green Apple Project. The equipment would be driven onto (roll on) barges and remain on the road transport equipment to facilitate drive off (roll off) at Gulf Road. The equipment would then be transported north from the landing site, and then east/southeast to the Ferndale Refinery. To facilitate delivery, the landings would include use of a tug, heavy equipment, and construction of a temporary ramp system to off-load equipment from barges. The temporary ramp system would generally consist of a gravity-bearing pier support (e.g., stacked pre-cast concrete blocks, timber cribbing, timber crane mats) that would support a series of steel flange ramps with tapered ends. The ramps would be laid from the barge to the edge of Gulf Road. Once the cargo has been off-loaded, the ramp system would be removed, and the area would be returned as close as practicable to its pre-landing condition.

The proposed barge landing site is located northwest of the refinery at the southern terminus of Gulf Road along the shoreline of the Strait of Georgia, within Section 19, Township 39 North, Range 1 East, W.M., Assessor tax parcels 390119-438360 and 390119-388424. The proposed location has previously been utilized for multiple barge off-loads of over-sized equipment for nearby industrial complexes. The Gulf Road barge landing site contains cobbles and small boulders that cover the entire beach. Sediments under the cobbles are primarily pebble size or larger with sand; clays and silts are virtually nonexistent. The beach has been modified by historic fill associated with construction of Gulf Road (Whatcom County road) and former residential/commercial development. Wave action has eroded the seaward edge of the road, which is loosely armored with riprap and concrete rubble. No vegetation removal or alteration is proposed or anticipated in association with barge landing activities.

Temporary fill may be used at Gulf Road to facilitate the temporary barge landing activities. Clean temporary fill from an agency-approved source may be placed on top of geotextile fabric, landward of mean higher high water (MHHW = 9.15 feet above mean lower low water [MLLW]) to establish a base for construction of temporary ramp supports and/or to level and stabilize the Gulf Road shoulder. The specific amount and area of temporary fill, if any, would be determined based on site-specific conditions prior to submittal of barge landing permit applications. There will be no permanent re-grading of the barge landing site. All fill, geotextile fabric, and ramp supports would be removed upon completion of the barge landings. No beach grading is proposed at the Gulf Road site. Barge off-loads would also occur during high tide cycles to avoid grounding and prevent prop scour of the bed. The proposed work area would be located between the marine barges and Gulf Road. Any temporary fill, if required, would be placed above MHHW (9.15 feet above MLLW) and any temporary ramp support structures would be constructed above mean high water (MHW; 8.32 feet above MLLW). Use of the offloading site would be localized and temporary. Disturbance of sediment in nearshore waters is unlikely to extend more than 150 feet from the site, and turbidity would return to normal level within minutes to hours.

A transport company would apply for Whatcom County and WDFW permits for off-loading up to four pieces of large process equipment by barge at the Gulf Road barge landing site. Because permits would be applied for separately from the Green Apple Project, barge offloading will not be discussed further in this BA. It is assumed, however, that the barge offloading would adhere to timing restrictions related to ESA-listed salmonids and forage fish habitat windows. Timing restrictions are usually imposed by the USACE, USFWS, WDFW, and NMFS to protect ESA-listed salmonids and forage fish habitat (WAC220-660-330; USACE 2017).

2.3.2 Cascade Natural Gas

For the project's natural gas supply, Cascade Natural Gas is planning to implement natural gas infrastructure upgrades outside the renewable diesel plant boundary, which would include an estimated 7.5 miles of new 20-inch-diameter pipeline within the existing Cascade Natural Gas right-of-way. Green Apple would require approximately 15,000 million British Thermal Units/day (MMBTU/D) of natural gas, which would be sourced from Canada. The pipeline maximum allowable operating pressure would be 800 pounds per square inch gauge (psig). The pipeline would be "piggable" and equipped with emergency shut-down valves and blow-down stacks. The structural integrity of this new pipeline would be routinely assessed in accordance with a UTC-approved Integrity Management Plan. The anticipated routing for the natural gas infrastructure upgrades includes two railroad crossings, three creek/river crossings and no highway crossings.

The natural gas supply infrastructure improvements include approximately 14 wetlands currently mapped by Whatcom County along the pipeline route, approximately nine drainage/irrigation ditches adjacent to roadways, and includes crossing the Sumas River and crossing approximately six streams. Three of these water bodies are regulated under Whatcom County's Shoreline Management Program – Fishtrap Creek, Johnson Creek, and the Sumas River. Directional drilling is planned for the installation of natural gas supply infrastructure to minimize impacts to water bodies regulated under Whatcom County's Shoreline Management Program. Biologists are scheduled to survey the pipeline routing to further identify and describe wetlands, ditches, and streams along the route.

Permitting for these natural gas infrastructure upgrades would be pursued separately from the Green Apple Renewable Fuels Project by Cascade Natural Gas, and will not be discussed further in this BA.

2.4 Project Timeline

Construction is proposed to start in mid/late 2020, with operation beginning in mid/late 2022. Construction is anticipated to be continuous rather than phased.

2.5 Impact Avoidance and Minimization Measures

Minimization measures have been identified to avoid and minimize impacts to listed species. Green Apple would implement best management practices (BMPs) during construction and operation of the new facilities to minimize impacts. State and federal regulations also require or suggest BMP's outside Green Apple's control to enforce that relate to vessel operations and marine mammal protection.

2.5.1 Construction BMPs

- The pipelines would be of welded steel, constructed per the American Society of Mechanical Engineers B31 Code for Pressure Piping, and tested per applicable regulations including API 570 piping inspection requirements.
- The Green Apple Project would be designed to meet building setbacks for renewable fuel storage, collection vents, and flame arrestors on tanks and would not allow open flames on site.
- The renewable naphtha storage tank risks would be mitigated with full tank containment, foam blanketing fire suppression, and suppression (floating roof) of vent gases.
- Impacts to wetland habitats would be mitigated through either restoration, creation, enhancement, preservation, or a combination of mitigation methods to replace wetland function and area commensurate with the permanent wetland impacts resulting from the project (discussed more in Section 2.6).
- During construction, risks would be controlled through stormwater management BMPs that would be applied following the requirements of the construction SWPPP. These BMPs may include the use of silt fences, temporary stormwater ponds, or other appropriate methods.
- Cut slopes and soil stockpiled on the site would be protected during construction by placing plastic sheeting on exposed cut slopes.

- Duration of open excavation on the site would be limited to the shortest time possible.
- Disturbed soils that are exposed to surface water runoff would be stabilized.
- Temporary construction erosion and sediment control measures would be installed prior to site grading activities. These measures may include erosion control fencing, straw wattles, silt dikes, catch basin inserts, and/or other applicable measures.
- Permanent site stabilization measures would be implemented, such as re-vegetating or permanently stabilizing (e.g., pavement, gravel) exposed soils that are susceptible to erosion within 30 days of project completion.

2.5.2 Operational BMPs

- Phillips 66 maintains an Integrated Contingency Plan (ICP) for the refinery. This ICP incorporates, and is intended to meet, regulations regarding oil and dangerous waste spill prevention, emergency actions, and contingency planning. If it is determined that Green Apple is a new stand-alone company that is deemed a "Class 1 facility" [as defined by WAC 173-180-025(8)], a facility-specific ICP would be developed in accordance with Ecology and EPA requirements. Also, a facility-specific Oil Spill Prevention Plan and an Operations Manual would be developed in accordance with Ecology and EPA requirements. Lastly, a written Training and Certification Program that addresses all oil-handling personnel and Persons-in-Charge (PICs) at the facility/dock would be developed in accordance with Ecology requirements. If it is determined that Green Apple will be deemed an expansion of the existing Phillips 66 Ferndale Refinery (which is already operating as a Class 1 facility) and not a new stand-alone company, the Phillips 66 Ferndale Refinery would revise their already approved ICP, Oil Spill Prevention Plan, Operations Manual, and written Training & Certification Program.
- To prevent waste material from entering ground or surface waters, waste material containment would be installed in all tank farm and rail areas with capacity to contain the largest tank or rail car, respectively, plus a 6-inch allowance for a storm event in compliance with National Fire Protection Association 30 requirements.
- New tanks and rail areas for renewable feedstocks, renewable products, and to support renewable fuel processing would be installed in new or existing containment areas with capacity to contain the largest tank or rail car, respectively, plus a 6-inch allowance for a storm event in compliance with National Fire Protection Association 30 requirements. The containment would consist of a concrete or covered bentonite clay membrane liner designed and approved by a registered State of Washington Geotechnical Engineer. All tanks would be monitored for leaks using electronic leak detection devices. The collection sump would also be monitored continuously by conductivity meters or other devices to determine if product is collecting in the sump. The tank farm storage tanks would be on grade-level or elevated foundations (no below-grade tanks or piping), within bermed areas constructed of an impervious material.
- During operation, the facility would control risks by following the SWPPP and Spill Prevention Control and Countermeasure (SPCC) plan to prevent liquid products from leaving the containment areas. Spill kits would be placed in strategic and easily accessible locations for use if small spills occur. If an uncontained spill should occur, the operator would notify Ecology and other agencies of the situation, as required by law.
- Industry standard or established safe work practices and policies would be followed to reduce or control environmental health hazards. Industry standard health, safety, and environmental management policies would be implemented and followed to reduce hazards.
- Unloading operations would be continuously staffed during transfer operations. The load/unload operations will be in compliance with the U.S. Oil Pollution Control Act and in conformance with an approved SPCC Plan approved by a Registered Professional Engineer.
- Procedures and engineering controls would be in place to prevent releases of raw materials and products that would be loaded and unloaded. The bulk tank farm would be constructed to API 650 standards with impervious containment to capture the largest tank and accumulated precipitation. Tanks would be equipped with over-pressure protection, high-level alarms, and emergency overflows into the

containment area. Tanks would be inspected and repaired in accordance with the most recent revision of API 653. Rail car loading and unloading would be conducted only in contained areas.

- The Facility Transfer Operations Manual and/or BMPs would be followed before, during, and after the transfer of material.
- Green Apple would contract with local and national spill response companies to provide the required 20,000 bbl and 26,800 bbl (24- and 48-hour timeframe respectively) on-water storage. It is important to note that all inbound and outbound vessels would be covered by the Washington State Maritime Cooperative (WSMC) Oil Spill Contingency Plan.
- WSMC and Ecology would be notified of project vessels arriving once vessels have been confirmed. Vessels calling on the Phillips 66 Ferndale Refinery must be enrolled with WSMC or have a state-approved contingency plan.
- The worst-case discharge volume of each arriving vessel would be identified and communicated to WSMC, the spill response contractor, and Ecology.
- An on-site response vessel would be available at the Phillips 66 Ferndale Refinery dock at all times.
- A third party would position a skimmer vessel (oil spill response vessel) at the dock during transfer.
- Pre-booming would be implemented if it is safe and effective per Ecology-approved Safe and Effective threshold determination criteria. Or, a third party would be arranged to provide a boom boat positioned at the dock during transfer.
- During the entire transfer operation, a Terminal Person in Charge would be in attendance at the dock, and a required Vessel Person in Charge would be in attendance at the vessel.
- The Phillips 66 Ferndale Refinery existing emergency response plans for rail transportation would be updated.

2.5.3 State and Federal Regulated Vessel-Operating BMPs and Procedures, and Marine Mammal Protection

The following environmental protection BMPs and procedures are presented to provide the regulatory framework for evaluating potential effects of the project on biological resources but are not enforceable by the project proponent.

- Project vessels calling at the refinery would be of double-hulled design, in accordance with the Oil Pollution Act of 1990.
- Project vessels calling at the refinery shipping petroleum and/or FOG cargos would be covered by the WSMC Oil Spill Contingency Plan and would adhere to Ecology's Oil Spill Prevention and Contingency Planning requirements (WAC Chapter 173-182).
- Renewable feedstock or renewable fuel tankers between 40,000 and 125,000 deadweight tons, possessing specified equipment and characteristics (such as double hulls), would be escorted through Puget Sound, Haro Strait, Boundary Pass, and portions of the Strait of Georgia by a tug or tugs with combined horsepower of, or equivalent to, at least 5 percent of the deadweight tonnage of the escorted tanker (Revised Code of Washington [RCW] 88.16.190 [Change in 2019, see 1578-S.SL]).
- Vessels calling at the refinery would follow recommended speed limits not to exceed 10 knots when transiting Rosario Strait, per the Puget Sound Harbor Safety Plan (PSHSC 2017).
- Vessels calling at the refinery would obtain a tug escort when transiting Rosario Strait per House Bill 1578 (revised amended RCW 88.16.190 per Engrossed Substitute House Bill [ESHB] 1578[Change in 2019, see 1578-S.SL])
- In U.S. and Canadian waters of Haro Strait and Boundary Pass, vessels would adhere to voluntary slowdown procedures during the summer months of June through October, including maintaining 11.5 knots or less, when navigationally safe to do so, as recommended by the Enhancing Cetacean Habitat and Observation (ECHO) Study Program led by the Vancouver Fraser Port Authority since 2017.

- Vessel speeds would comply with established navigation, safety and marine environmental protection requirements (33 CFR 161), and State of Washington vessel speed regulations, which include requirements that oil tankers under tug escort must not exceed the service speed of the tug (RCW 88.16.195).
- Vessels would adhere to U.S. Coast Guard (USCG)-regulated vessel traffic within different types of limited or controlled access areas referred to as safety zones, security zones, and regulated navigation areas (33 CFR 165).
- Vessels would adhere to NMFS regulations under the ESA and Marine Mammal Protection Act that prohibit vessels from approaching Southern Resident killer whales (*Orcinus orca*) within 200 yards (and from parking in the path of whales when in inland waters of Washington State (76 FR 20870) (50 CFR 224.103(e)).
- In U.S. waters, vessels would comply with the following, where applicable and as required under 2SSB 5577 (revised the amended RCW.77.15.740 (Change in 2019, see 5577-S2.SL): reduce vessel speed to 7 knots, when navigationally safe to do so, within 0.5 nautical mile (nm; 1,013 yards) of Southern Resident killer whales; maintain a distance of 300 yards (amended from 200 yards) or greater from Southern Resident killer whales; and maintain a distance of 400 yards or greater behind or in the path of Southern Resident killer whales. Note that vessels within a Vessel Traffic Service area that are following a Traffic Separation Scheme or complying with a vessel traffic service measure of direction are exempt from these requirements.
- In U.S. and Canadian waters of Haro Strait and Boundary Pass vessels would adhere to voluntary vessel slowdown procedures during the summer months of June through October, including maintaining 11.5 knots or less, when navigationally safe to do so, as recommended by the Enhancing Cetacean Habitat and Observation (ECHO) Study Program led by the Vancouver Fraser Port Authority since 2017.
- In U.S. waters of Rosario Strait vessels would adhere to the voluntary Puget Sound Harbor Safety Committee (PSHSC) published Standards of Care recommendations for a vessel speed not exceed 10 knots when transiting Rosario Strait.

2.6 Mitigation for Wetland Impacts

Construction of the Green Apple Project would permanently impact four wetlands within the refinery property. These wetlands are characterized as palustrine emergent, seasonally flooded/saturated wetlands under the Cowardin system, and rate as Category IV wetlands according to the 2014 version of Ecology's rating system (AECOM 2019a). Applicants for any compensatory mitigation effort are required to avoid, minimize, restore, and compensate for wetland impacts. Wetland impacts for the Green Apple Project were deemed unavoidable, as wetlands are present throughout most of the project area. Impacts to wetlands would be minimized by siting the project in low-quality, degraded wetlands rather than high-quality forested wetlands present on the Phillips 66 Ferndale Refinery property. Temporarily impacted wetlands would be restored to present functioning levels post-construction, and all temporarily impacted wetlands and buffer areas would be monitored after project completion to ensure successful restoration.

2.6.1 Wetland Impacts

The project would permanently impact a total of 12.61 acres (plus 3.0 acres of buffer) of degraded Category IV emergent, depressional wetlands due to the construction of the proposed Green Apple Project. These wetlands are dominated by pasture grasses such as bentgrass (*Agrostis* sp.), tall fescue (*Schedonorus arundinacea*), reed canarygrass (*Phalaris arundinacea*), and velvet grass (*Holcus lanatus*), as well as soft rush (*Juncus effusus*) and slough sedge (*Carex obnupta*). The impacted wetlands rate low for water quality functions, hydrologic functions, and habitat functions (AECOM 2019b).

To compensate for unavoidable wetland impacts associated with the Green Apple Project, an off-site mitigation strategy would be implemented (AECOM 2019b). This wetland mitigation strategy aims to replace ecosystem processes that are degraded within the wider watershed context. To mitigate for the unavoidable impacts to wetlands associated with the Green Apple Project, two wetland sites within the Lummi River watershed have been selected for mitigation.

2.6.2 Mitigation Sites

The first site (named “Wetland NN”) is located within the Phillips 66 Ferndale Refinery property, approximately 1 mile southwest of the project impact area, within tax parcel number 390133110048. The entire wetland is 15.4 acres and contains palustrine emergent and forested vegetation classes. The emergent class, which is proposed for mitigation, is estimated at approximately 12 acres. It contains saturated and seasonally flooded areas. The emergent wetland is dominated by tall fescue, slough sedge, reed canarygrass, sweet vernal grass (*Anthoxanthum odoratum*), soft rush, bird’s-foot trefoil (*Lotus corniculatus*) and other common pasture species. The wetland rates as a Category IV, providing low water quality and hydrology functions. It rates moderate for habitat functions due to the presence of forested and emergent vegetation classes, three hydroperiods, and a seasonally flowing stream.

The second site, named “the Barci Parcels,” is located in the headwaters of an unnamed tributary of the Lummi River. It is located approximately 0.3 mile east of the project impact area. This property consists of two parcels on the east side of Lake Terrell Road, just northeast of the Phillips 66 Ferndale Refinery. Vegetation in the wetlands is dominated by common pasture species including bentgrass, bluegrass (*Poa* sp.), foxtail (*Alopecurus* sp.), fescue (*Festuca* sp.), velvet grass, and others. The vegetation is grazed seasonally by cattle and also mowed for hay. Grazing by Canada geese (*Branta canadensis*) is also evident.

Two wetlands have been identified on the 114-acre Barci Parcels property:

- Wetland A occurs on both the south and the north parcels (tax parcels #390127062148 and #390127068336, respectively). It is estimated at 44 acres and is a palustrine, emergent, saturated wetland. It rates as a Category IV wetland, providing moderate water quality functions, low hydrology functions, and low habitat functions.
- Wetland B occurs on the north parcel and extends off-site to the north to Mountain View Road. The on-site portion is estimated at 9 acres. It is a palustrine, emergent, saturated and seasonally flooded wetland. It rates as a Category III wetland, providing moderate water quality functions, low hydrology functions, and low habitat functions.

2.6.3 Mitigation Strategy

Within the constraints of this project, the mitigation goals will be achieved by the following activities:

- Rehabilitation of degraded, emergent wetland at the Barci Parcels mitigation site by filling or plugging drainage ditches, removing sidecast or other fill material, modifying topography and wetland flow paths, planting native wetland species and controlling invasive species, and installing habitat features.
- Enhancement of degraded emergent wetland at the Barci Parcels and Wetland NN mitigation sites by planting native wetland species, controlling invasive species, and installing habitat features.
- Enhancement of degraded herbaceous buffers at the Barci Parcels mitigation site by planting native buffer species and controlling invasive species.

3. Action Area

This chapter describes the action area and is the basis for determining species addressed, establishing the environmental baseline, and analyzing project effects described in the following chapters. The project area is defined as the geographic extent in which proposed activities would occur and where direct effects to species and critical habitats may occur. In contrast, the action area includes all areas affected directly or indirectly by the federal action and not merely the immediate area involved in the action (50 CFR 402.02). The action area is the geographic extent of the physical, chemical, and biological effects resulting from the Green Apple Project, including direct and indirect effects and effects of interrelated and interdependent activities. Potential effects are grouped into terrestrial and marine zones of impact. Sources of disturbance that could potentially influence ESA-listed species or suitable habitat include airborne construction noise and increased vessel traffic (aquatic impacts), as described below.

3.1 Action Area in the Terrestrial Environment

The terrestrial action area for the Green Apple Project is limited to those areas directly or indirectly affected by the project. In this case, airborne noise due to construction represents the most far-reaching terrestrial effects from the project. However, the terrestrial action area also includes areas of habitat modification, visual disturbance, and increased in stormwater runoff.

3.1.1 Habitat Modification

Construction of the renewable fuels facility would include permanent clearing of approximately 17.6 acres of non-native grass dominated fields. Another 2.9 acres of currently impervious surface would be redeveloped. Approximately 10.5 acres would be cleared for temporary construction storage, laydown areas, construction operations, and access. Temporary construction areas would be restored to preconstruction conditions following project completion.

Total grading quantities would include approximately 345,000 cubic yards of site stripping and excavation, and approximately 390,000 cubic yards of fill. The completed project would result in approximately 768,000-square-feet of new impervious surfaces, and approximately 130,000-square-feet of redeveloped impervious surface. An additional 455,000 square feet would be temporarily impervious during construction and restored to grass fields after the project is complete.

The project would permanently and temporarily impact 12.61 acres and 5.9 acres of palustrine emergent wetland habitat respectively, and permanently impact 3.0 acres of wetland buffer. The habitat modification area includes construction, cut/fill, and vegetation disturbance areas. To mitigate for these impacts, 11.2 acres of wetland would be rehabilitated, and 0.9 acre of ponded land would be rehabilitated at the Barci Parcels. Additionally, 11.9 acres of emergent wetland and 1.52 acres of wetland buffer would be enhanced at Wetland NN (AECOM 2019b).

3.1.2 Visual Disturbance

Visual disturbance would be limited to construction areas and new structures. The limit of visual disturbance is typically line of sight from construction, which was determined to be no more than 500 feet for the proposed action, as the project area is within an industrial site. Other than a potential dedicated Green Apple flare stack, the tallest structure for the Green Apple Project would be the heater stack at approximately 100 feet, which is shorter than most heater stacks and flares at the Phillips 66 Ferndale Refinery.

Green Apple would either connect to the existing Phillips 66 Ferndale Refinery flare or incorporate a dedicated Green Apple flare. If a dedicated Green Apple flare is required, the stack would be less than 198 feet tall and shorter than the existing flare stack at the Phillips 66 Ferndale Refinery.

3.1.3 Stormwater

Construction of the renewable diesel production facility with associated tankage and transportation facilities would result in an approximate total of 768,000-square-feet of new impervious surfaces and an approximate total of 130,000-square-feet of redeveloped surface at the site. Stormwater generated by the renewable diesel process area facilities would be routed to the Phillips 66 Ferndale Refinery's stormwater system, the existing WWTP, and a new on-site stormwater management system that would be designed in accordance with Whatcom County Development Standards and the 2014 Ecology Stormwater Management Manual for Western Washington (SWMMWW). Non-process area runoff would be directed to the new stormwater pond immediately adjacent to the renewable diesel production facility. New renewable diesel plant project elements within existing developed areas would use existing Phillips 66 Ferndale Refinery drainage conveyance systems. Surface water from areas utilizing the existing WWTP would be routed to an existing stormwater sewer that runs parallel to 4th Street immediately south of the proposed Green Apple renewable diesel plant site.

Stormwater from the renewable diesel production facility site, as well as from storage tank locations (i.e. stormwater that could potentially contain contaminants), would flow to an oil/water separator and then to the Phillips 66 Ferndale Refinery's wastewater treatment plant (WWTP). The Green Apple oil/water separator would

include a high flow bypass to prevent overwhelming the Phillips 66 Ferndale Refinery's sewer system. This high flow bypass would be routed to the Green Apple stormwater detention pond.

Production facility site stormwater that would not be routed to the WWTP or other existing treatment structure (i.e. stormwater with a low potential to contain contaminants) would be routed to a new on-site stormwater management system which would include a stormwater detention pond. The Green Apple stormwater detention pond would include discharge valving to allow for routing of contaminated stormwater to the WWTP.

The stormwater from the rail area would be split with the undeveloped flow continuing in the existing ditch along 2nd Street (which would be moved north of the new rail alignment), while the improved area for the rail unloading facility will be directed to the WWTP.

For the new tanks installed in existing tank containments within the Phillips 66 Ferndale Refinery, the stormwater would continue to be directed to the Phillips 66 Ferndale Refinery's WWTP.

The Phillips 66 Ferndale Refinery's existing NPDES discharge permit (#WA0002984) would be revised to account for the additional stormwater.

The treated stormwater would eventually flow into the Strait of Georgia in accordance with the Phillips 66 Ferndale Refinery NPDES discharge permit. It is anticipated that treated stormwater discharge from a new stormwater management system would follow current flowpaths to the large wetland complex outside the renewable diesel plant project area that is connected to Lummi Bay via an unnamed, seasonal stream. The stormwater would be monitored prior to discharge, in accordance with NPDES requirements.

3.1.4 Airborne Noise

Airborne noise would have the most far-reaching terrestrial environmental effects. The extent of airborne noise impacts would include the maximum extent noise would travel as a result of the project. For the Green Apple Project, construction of the project facilities is anticipated to be louder than operation. Consequently, the extent of noise generated by construction equipment that would be elevated above ambient (background) noise levels was used to determine the terrestrial portion of the action area. The noise distances calculated for construction of the Green Apple facilities and the mitigation sites differ because there would be different construction equipment and ambient noise in these two areas.

Ambient and construction noise associated with the project construction would be different than the noise associated with wetland mitigation construction. Consequently, the airborne noise calculations and subsequent action areas differ between the two terrestrial project components.

3.1.4.1 Construction of the Green Apple Facilities

For this analysis, ambient noise levels for the refinery were estimated to be 75 A-weighted decibels (dBA). In-air noise levels for construction actions were calculated using the Washington State Department of Transportation's (WSDOT's) Noise Analysis guidance (WSDOT 2019). Construction noises would be temporary, and estimated noise levels are based on the following:

- A maximum construction in-air noise level of 105 dBA is based on the loudest three proposed pieces of construction equipment and dBA addition protocols listed in the Construction Noise Impact Assessment manual (WSDOT 2019).

The distance at which project construction airborne noise would attenuate to ambient noise levels is approximately 1,600 feet as indicated by the placement of Terrestrial Action Area boundary on Figure 3.

3.1.4.2 Construction of the Wetland Mitigation Sites

For this analysis, ambient noise levels for the mitigation site were estimated to be 50 dBA based on proximity to the refinery, traffic, and residential areas. In-air noise levels for construction actions were calculated using the

Washington State Department of Transportation's (WSDOT's) Noise Analysis guidance (WSDOT 2019). Construction noises would be temporary, and estimated noise levels are based on the following:

- A maximum construction in-air noise level of 84 dBA is based on the proposed construction equipment for the mitigation site (WSDOT 2019).

The distance at which construction airborne noise associated with the mitigation sites would attenuate to ambient noise levels is approximately 1,200 feet as indicated by the placement of Terrestrial Action Area boundary on Figure 3. It should be noted the calculated distance of airborne construction for Wetland NN attenuates to the nearshore but would not likely travel further than the shoreline.

3.2 Action Area in the Marine Environment

The marine action area for the Green Apple Project is limited to those areas directly or indirectly affected by the project. The Green Apple Project would impact the marine environment through effects associated with barge operations and unloading oversized equipment, vessel traffic, underwater noise, displacement of fish and marine mammal species, and an increased risk of spill events.

3.2.1 Vessel Traffic

A 3-mile buffer from the refinery dock was established based on the following factors: disturbance from noise generated by increased vessel traffic, disturbance from vessel transit to and from the refinery dock from existing shipping lanes (Figure 4) and parking, and potential for spills.

3.2.1.1 Underwater Noise

Under anticipated traffic volumes, the project would increase marine traffic associated with the Phillips 66 Ferndale Refinery by 143 vessels per year. Vessel traffic generates underwater noise that could potentially result in disturbance to fish and marine mammals in the action area. Vessel traffic in Puget Sound contributes to sound from 10 Hertz (Hz) to above 10 kilohertz (kHz) (Basset et al. 2012) and is the most common source of anthropogenic noise in the Strait of Georgia. The increase in vessel traffic associated with the Green Apple Project could impact marine organisms through an increase in sound levels. Any noise attributed to project vessel traffic would be temporary, and the affected area would be expected to immediately return to the original state within hours as the vessel moves through the affected area. Because vessel traffic and shipments would have different destinations and routes to established shipping lanes, the extent of impact was determined to be 3 miles from the refinery dock (Figure 3).

A separate vessel transportation study for the Green Apple Project analyzes risks from vessel traffic throughout the Salish Sea, including the Strait of Juan de Fuca, Haro Strait, Boundary Pass, Rosario Strait, and portions of the Strait of Georgia, Bellingham Bay, and Boundary Bay (ERM 2019).

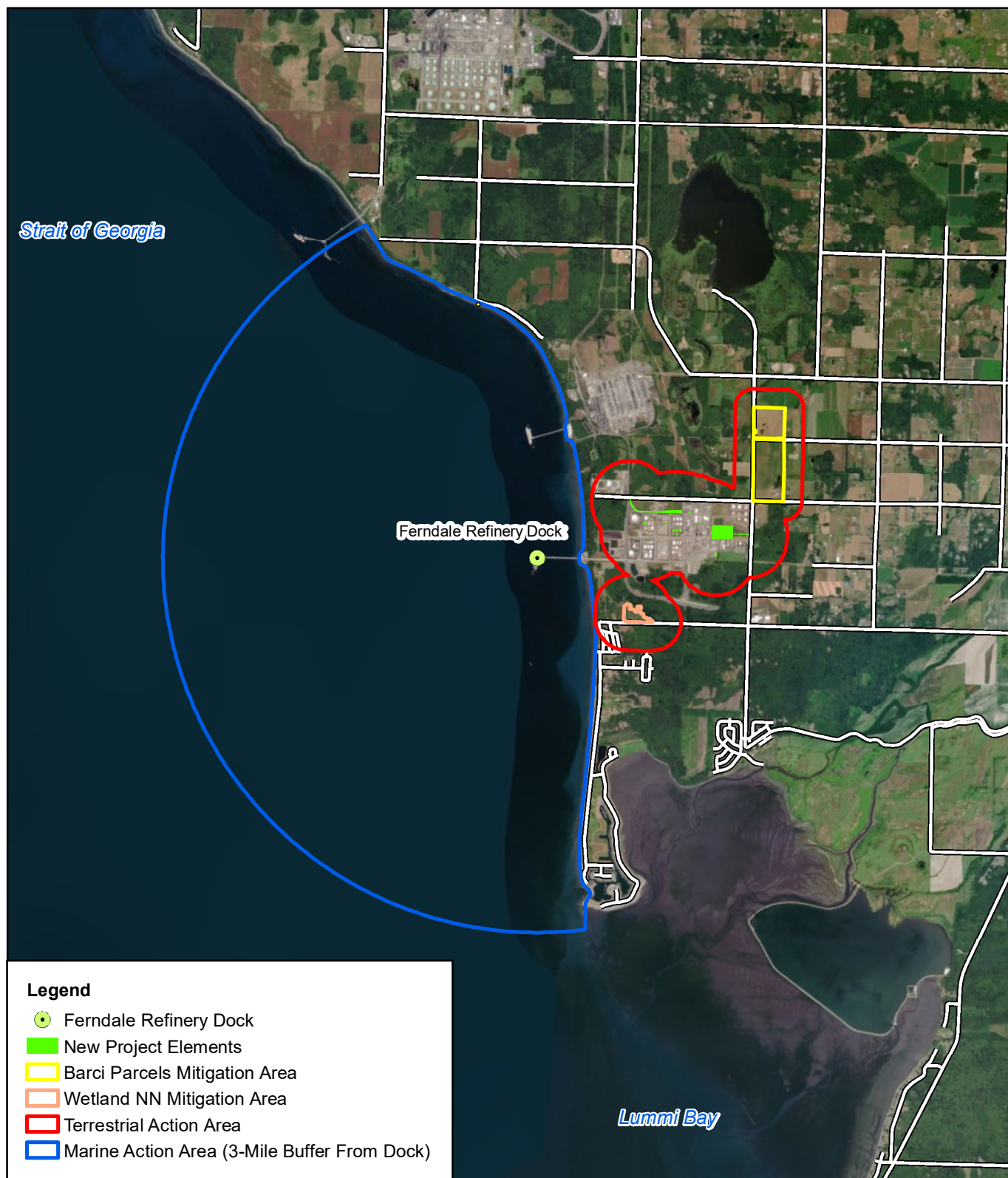
3.2.1.2 Displacement

Vessel traffic movement and parking results in short-term displacement of the water column and can lead to changes in distribution of fish and marine mammals. Marine mammals exposed to high levels of human activities may leave the area, habituate to the activity, or tolerate the disturbance and remain in the area (Wartzok et al. 2003). The extent of impact would be limited to the immediate area around the vessel.

3.2.1.3 Potential Spills

Because of increased vessel traffic there may also be an increased potential for spills, although the risk would remain relatively low. Oil spills have the potential to impact a wide variety of organisms, and this risk is potentially exacerbated by the geography of Washington State (Ecology 2011). Due to the confined nature of the marine waters of the Salish Sea, a large oil spill has the potential to reach shoreline habitats much more quickly than a similar spill in the open ocean (Ecology 2011). As marine nearshore waters are often much more productive than

the open ocean, a spill in the Strait of Georgia could potentially impact a much larger variety of wildlife and habitats, including ESA-listed species addressed in the assessment.



Note: Terrestrial Action Area was determined by creating a 1,600-foot buffer from new project elements, and a 1,200-foot buffer from mitigation sites.

ACTION AREA

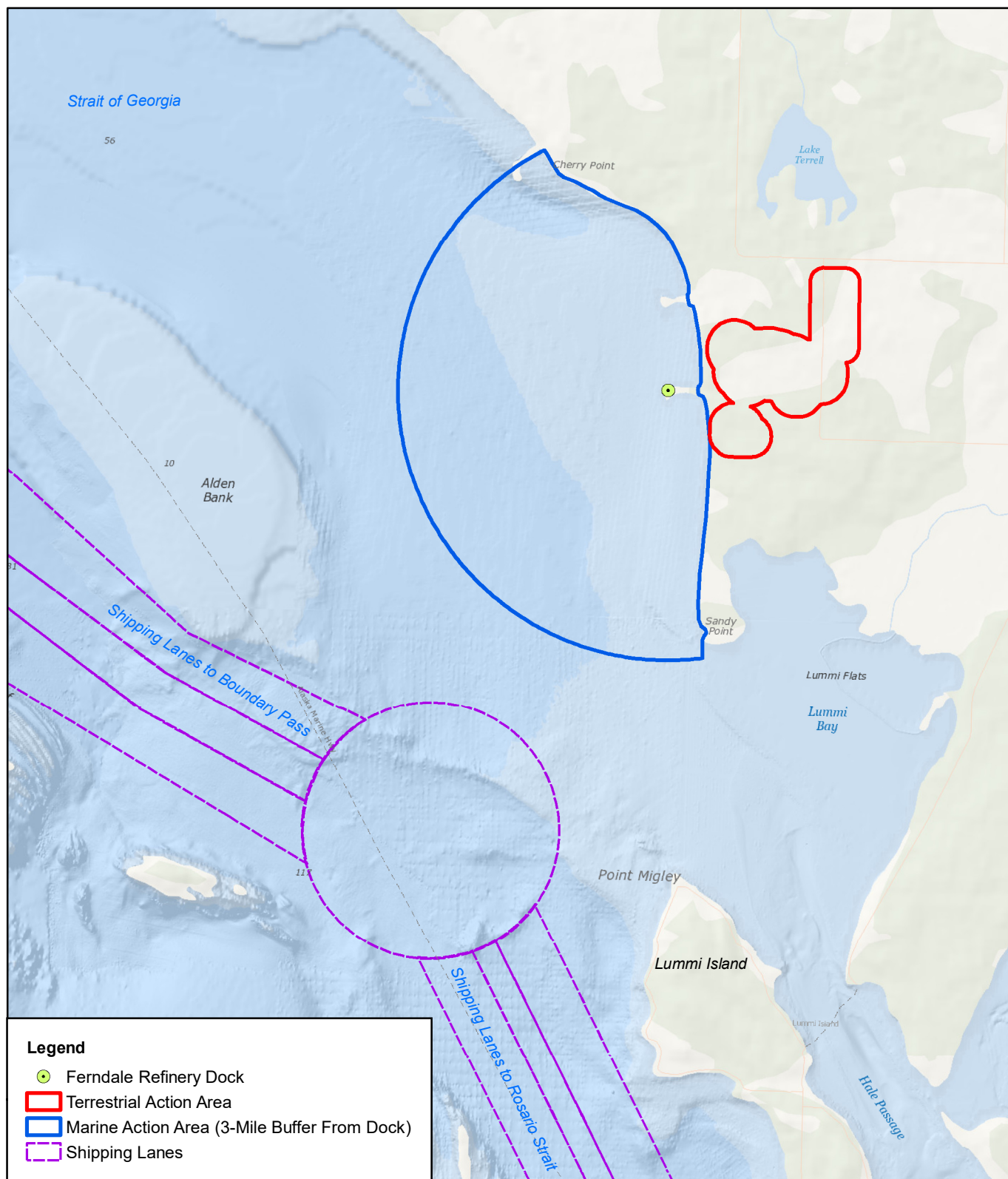
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FIGURE 3



Note: Terrestrial Action Area was determined by creating a 1,600-foot buffer from new project elements, and a 1,200-foot buffer from mitigation sites.

WATERWAYS AND SHIPPING LANES

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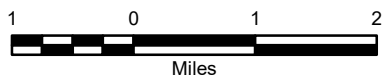


FIGURE 4

4. ESA-Listed Species and Critical Habitats

Information for this BA was gathered from several sources, including WDFW priority habitat and species data (WDFW 2019a), WDFW SalmonScape web site (WDFW 2019b), NMFS (NMFS 2019a) and USFWS species lists (USFWS 2019), and local agency biologists. The USFWS (2019) list from the IPaC (Information, Planning, and Conservation) website is provided in Appendix B.

AECOM biologists conducted site visits on November 5-6, and December 3, 2018, and April 8-10, 2019, (AECOM 2019a) to document site conditions, including potential fish and wildlife habitat and sensitive plant communities.

The Washington Department of Natural Resources Natural Heritage Program database does not indicate that any threatened or endangered plants occur within the action area (Washington Natural Heritage Program 2019). No federally listed or proposed plant species have been identified within the action area, nor does suitable habitat for these species exist within the action area.

Table 1 identifies ESA-listed fish and wildlife species potentially affected by project activities. Additional information regarding species distribution and likely presence in the action area is discussed in the following sections. The species are ESA-listed as an evolutionarily significant unit (ESU) or a distinct population segment (DPS), where appropriate.

Table 1. Species Addressed in this Biological Assessment

Species	ESA Status	Critical Habitat Designated
Species Under USFWS Jurisdiction		
Fish		
Bull Trout <i>Salvelinus confluentus</i>	Threatened	Designated in Action Area
Dolly Varden <i>Salvelinus malma</i>	Proposed Similarity of Appearance (Threatened)	Not Designated
Amphibians		
Oregon Spotted Frog <i>Rana pretiosa</i>	Threatened	Not Designated in Action Area
Birds		
Marbled Murrelet <i>Brachyramphus marmoratus</i>	Threatened	Not Designated in Action Area
Streaked Horned Lark <i>Eremophila alpestris strigata</i>	Threatened	Not Designated in Action Area
Yellow-billed Cuckoo <i>Coccyzus americanus</i> Western DPS	Threatened	Not Designated in Action Area
Mammals		
Gray Wolf <i>Canis lupus</i>	Proposed Endangered	Not Designated
North American Wolverine <i>Gulo gulo luscus</i>	Proposed Threatened	Not Designated

Species	ESA Status	Critical Habitat Designated
Species Under NMFS Jurisdiction		
Fish		
Chinook Salmon <i>Oncorhynchus tshawytscha</i> Puget Sound ESU	Threatened	Designated in Action Area
Steelhead <i>Oncorhynchus mykiss</i> Puget Sound DPS	Threatened	Not Designated in Action Area
Bocaccio <i>Sebastes paucispinis</i> Puget Sound/Georgia Basin DPS	Endangered	Designated in Action Area
Yelloweye Rockfish <i>Sebastes ruberrimus</i> Puget Sound/Georgia Basin DPS	Threatened	Designated in Action Area
North American Green Sturgeon <i>Acipenser medirostris</i> Southern DPS	Threatened	Not Designated in Action Area
Pacific Eulachon (Columbia River Smelt) <i>Thaleichthys pacificus</i> Southern DPS	Threatened	Not Designated in Action Area
Marine Mammals		
Humpback Whale <i>Megaptera novaeangliae</i>		Not Designated
Mexico DPS Central America DPS	Threatened Endangered	
Killer Whale <i>Orcinus orca</i> Southern Resident DPS	Endangered	Designated in Action Area

Sources: NMFS 2019a; USFWS 2019; 81 FR 29335.

Key: ESA = Endangered Species Act; ESU = Evolutionarily Significant Unit; DPS = Distinct Population Segment; FR = Federal Register; NMFS = National Marine Fisheries Service; USFWS = U.S. Fish and Wildlife Service

The Green Apple Project will have no effect on the streaked horned lark (*Eremophila alpestris strigata*), yellow-billed cuckoo (*Coccyzus americanus*), gray wolf (*Canis lupus*), or North American wolverine (*Gulo gulo luscus*). Additionally, this BA does not evaluate Dolly Varden (*Salvelinus malma*). These species are not discussed further in this BA for the following reasons:

- The Dolly Varden is considered threatened based on Similarity of Appearance to a threatened taxon (bull trout). Under the Similarity of Appearance provisions of the ESA, Section 4(e) authorizes a species to be treated as if it were endangered or threatened if it closely resembles a listed species and law enforcement personnel would have a substantial difficulty telling the two species apart. Although species listed under the Similarity of Appearance provisions receive some of the protections of the ESA, consultation requirements under Section 7 do not apply. Therefore, this assessment does not evaluate potential impacts to Dolly Varden.

- The streaked horned lark is not documented in the action area, and suitable habitat, which is typically low elevation grasslands with large portions of bare ground, does not occur in the action area. As the action area does not offer barren areas required for nesting (WDFW 2013, Moore 2011), no suitable habitat is present. Critical habitat was designated by the USFWS for this species in 2013 (78 Federal Register [FR] 61505), but no critical habitat is present in the action area.
- The yellow-billed cuckoo is not documented in the action area, and suitable habitat, which is typically large patches (at least 25 acres minimum size) of mature riparian forest habitat with at least 50 percent canopy cover, is not present in the action area. Critical habitat for this species has been designated (79 FR 48547), but none of the designated habitat is within Washington State and therefore does not occur in the action area.
- The gray wolf is not documented in the action area, and suitable habitat, which is typically large portions of undeveloped land with an abundant prey base, is not present in the action area. While gray wolves can occupy a variety of habitats, it is unlikely that any wolves would be residing within the boundaries of such a highly disturbed area. No wolf territories are known near the project area, and critical habitat has not been designated by the USFWS for this species.
- The North American wolverine is not documented in the action area, and suitable habitat, which is typically mountainous areas with persistent snow cover, is not present in the action area. Critical habitat has not been designated for this species.

4.1 Species under USFWS Jurisdiction

Species addressed in this assessment under USFWS jurisdiction include bull trout (*Salvelinus confluentus*), Oregon spotted frog (*Rana pretiosa*), and marbled murrelet (*Brachyramphus marmoratus*). Each species' description, habitat requirements, and listing status are provided in the following sections.

4.1.1 Bull Trout

The Coastal-Puget Sound DPS of bull trout was listed as threatened under the ESA in 1999 (64 FR 58910). The Puget Sound DPS encompasses all of Puget Sound and the Strait of Georgia extending to the Canadian border. Bull trout require very cool and stable stream systems with a high degree of connectivity to other water systems, as the species undergoes substantial migrations to spawn. USFWS first designated bull trout critical habitat in 2005 (75 FR 63898) and re-designated it in September 2010 (75 FR 63898). While bull trout are modeled as being present in the seasonal stream approximately half a mile southeast of the action area, the closest documented spawning stream for bull trout is Hutchinson Creek, approximately 25 miles east/southeast of the action area. Bull trout marine habitat does occur along the shoreline west of the Phillips 66 Ferndale Refinery. In marine nearshore areas of the Strait of Georgia and Puget Sound, which includes shorelines, critical habitat extends from the Mean Higher High Water (MHHW) line to -33 feet Mean Lower Low Water (MLLW) and is present in the action area.

4.1.2 Oregon Spotted Frog

The Oregon spotted frog was listed as threatened under the ESA in 2014 (79 FR 51658). The species is intimately tied to the amount of water in its environment: egg and tadpole development requires shallow warm water, adults require perennially deep pools for foraging and avoiding predators in the dry season, and all age classes require perennial pools during cold weather. Although there are wetlands in the action area, they are not likely to support Oregon spotted frogs due to only brief periods of shallow ponding in limited portions of the wetlands. The USFWS designated critical habitat for the Oregon spotted frog in 2016 (81 FR 29336), but critical habitat does not occur in the action area. Oregon spotted frogs are known to occur in the Sumas River (approximately 20 miles northeast of the project site) and the Black Slough of the lower South Fork Nooksack River (approximately 23 miles east of the project site) (79 FR 51657).

4.1.3 Marbled Murrelet

The marbled murrelet was listed as threatened under the ESA in 1992 (57 FR 45328). Marbled murrelets forage in marine waters of Georgia Basin and nest in old-growth forests (Speich and Wahl 1995). The species is unlikely to

nest in the action area or project vicinity. Not only are suitable nest trees with old growth forest characteristics absent from the action area, but baseline murrelet habitats surrounding the refinery are modelled to be “below threshold” to “not habitat capable” in terms of their quality for nesting (Falxa and Rafael 2016). Breeding season occurrences have not been documented in the action area, although murrelets may forage offshore in the Strait of Georgia (Pearson et al. 2014; WDFW 2013). Average estimated 2012 marine population densities of marbled murrelets was less than one bird per square kilometer at the nearest sampling unit around Sucia Island (San Juan Island system) (Falxa and Rafael 2016), and 2016 densities for Zone 1 (all Washington waters within Puget Sound and the Strait of Georgia) of the marbled murrelet Effectiveness Monitoring program were 1.319 birds per square kilometer (Pearson et al. 2018). As such, it is anticipated that any murrelet use of the action area would be limited to rare occurrences. The USFWS designated critical habitat for marbled murrelets in 1996 (61 FR 26256), but critical habitat does not occur in the action area.

4.2 Species under NMFS Jurisdiction

The species addressed by this assessment under NMFS jurisdiction include both fish and marine mammal species. Fish species include Puget Sound Chinook salmon (*Oncorhynchus tshawytscha*), Puget Sound steelhead (*Oncorhynchus mykiss*), Puget Sound/Georgia Basin bocaccio (*Sebastes paucispinis*), Puget Sound/Georgia Basin yelloweye rockfish (*Sebastes ruberrimus*), North American green sturgeon (*Acipenser medirostris*), and Pacific eulachon (*Thaleichthys pacificus*). Marine mammal species include humpback whale (*Megaptera novaeangliae*) and Southern Resident killer whale (*Orcinus orca*). Each species’ description, habitat requirements, and listing status are provided in the following sections.

4.2.1 Puget Sound Chinook Salmon

Chinook salmon found in Puget Sound are part of the Puget Sound ESU, listed as threatened under the ESA (64 FR 41836). This ESU encompasses all of Puget Sound, portions of the Strait of Georgia in Washington, and associated drainages. As the only streams in the action area are small ditch streams that are not listed as habitat for fish (WDFW 2019a, 2019b), there is no freshwater Chinook habitat within the action area. The closest river for Chinook spawning is the Nooksack River, approximately 5 miles to the southeast of the action area.

NMFS designated certain areas of Puget Sound and the Strait of Georgia where Chinook salmon have been documented as critical to the recovery of the species (70 FR 52487). Critical habitat was designated for nearshore marine areas of Puget Sound and the Strait of Georgia (which extend from extreme high water to -98 feet MLLW). Critical habitat is present in the action area.

4.2.2 Puget Sound Steelhead

The Puget Sound DPS of steelhead trout was listed as threatened under the ESA in May 2007 (72 FR 26722). The DPS includes steelhead from river basins of the Strait of Juan de Fuca, Puget Sound, southern portions of the Strait of Georgia, and the Hood Canal, Washington. Steelhead exhibit a complex suite of life history traits and can be anadromous or freshwater residents. The species spawns in freshwater and may spawn more than once. Individuals that are anadromous can spend up to 7 years in freshwater prior to undergoing the physiological and biological changes required to transition to saltwater, and then spend up to 3 years in saltwater prior to first spawning. Spawning occurs in the mainstem of the Nooksack River and major tributaries to the Nooksack River basin.

NMFS designated critical habitat for Puget Sound steelhead in 2016 (81 FR 9251). However, critical habitat for the species does not occur in the action area.

4.2.3 Puget Sound/Georgia Basin Bocaccio

Bocaccio were listed as endangered under the ESA on April 28, 2010 (75 FR 22276). NMFS completed a 5-year review on April 5, 2016, that resulted in no change in listing status (NMFS 2016a). Bocaccio are large piscivorous rockfish in eastern Pacific coastal waters ranging from Alaska to Baja California (COSEWIC 2002). Most commonly,

bocaccio are found from Oregon to California and were once common on steep walls of Puget Sound (Love et al. 2002).

In the Puget Sound region, adult bocaccio are limited to areas around Tacoma Narrows and Point Defiance (NMFS 2009a). However, in the Strait of Georgia, records of bocaccio are sparse, isolated, and often anecdotal in nature (NMFS 2009a).

NMFS designated critical habitat for bocaccio on November 13, 2014 (79 FR 68042), and critical habitat is present in the action area.

4.2.4 Puget Sound/Georgia Basin Yelloweye Rockfish

Yelloweye rockfish were listed as threatened under the ESA on April 28, 2010 (75 FR 22276). NMFS completed a 5-year review on April 5, 2016, that resulted in no change in listing status (NMFS 2016a). This species is rare in Puget Sound south of Admiralty Inlet (NMFS 2009a; Love et al. 2002). According to surveys, the farther south in Puget Sound the lower the potential for yelloweye rockfish presence or use (Gertseva and Cope 2017). This is likely due to fewer areas of rocky habitat in southern Puget Sound (Miller and Borton 1980). Yelloweye rockfish have historically been observed in the Strait of Georgia (NMFS 2009a).

NMFS designated critical habitat for yelloweye rockfish on November 13, 2014 (79 FR 68042), and critical habitat is present in the action area.

4.2.5 North American Green Sturgeon

The Southern DPS of green sturgeon was listed as threatened under the ESA on April 7, 2006. The listing was based on limited and decreasing spawning habitat and negative population trends (71 FR 17757). Green sturgeon are not frequently observed in the action area, though the extent to which they use Puget Sound and the Strait of Georgia is unknown (NMFS 2009b). A few adults and subadults have been incidentally captured in fisheries harvests, and two Southern DPS green sturgeon were observed south of Whidbey Island in 2006 (NMFS 2009b). In 2004 and 2005, tagged subadult sturgeon were detected in the Strait of Juan de Fuca but were not detected in the Strait of Georgia, likely because they do not migrate through the area (NMFS 2009b).

NMFS designated critical habitat for Southern DPS green sturgeon in 2009 (74 FR 52300). However, the critical habitat designation does not include any portion of the action area.

4.2.6 Pacific Eulachon

The southern DPS of Pacific eulachon was listed as threatened under the ESA in 2010 due to historically low numbers (75 FR 13012). Eulachon spend 3 to 5 years in saltwater before returning to freshwater to spawn from late winter through early summer. Spawning grounds are typically in the lower reaches of larger rivers fed by snowmelt (Hay and McCarter 2000). Juveniles typically rear in nearshore marine areas at moderate or shallow depths (NMFS 2016b) and migrate out to deeper water (up to 2,050 feet) as they mature (Allen and Smith 1988).

Eulachon are not common in the Strait of Georgia, and there is little information about the species within the action area. While there are reports of captured eulachon in the Strait of Georgia, studies of bycatch in shrimp trawls failed to confirm their presence there (Hay and McCarter 2000). The species is unlikely to occur in the action area.

NMFS designated critical habitat for the southern DPS of Pacific eulachon in 2011 (76 FR 65324) (NMFS 2011). However, critical habitat for the species does not occur in the action area.

4.2.7 Humpback Whale

Humpback whales were listed as endangered in 1973 under the ESA (NMFS 1991). NMFS reclassified the humpback whale into 14 DPSs (81 FR 62260) in 2016. Two of the ESA-listed DPSs have the potential to occur in the vicinity of

the project—the Mexico DPS, which is listed as threatened, and the Central America DPS, which is listed as endangered (81 FR 62260).

- The Mexico DPS, which breeds along the Pacific coast of Mexico and the Revillagigedo Islands, transits the Baja California Peninsula, and feeds across a broad range from California to the Aleutian Islands (Alaska)
- The Central America DPS, which breeds along the Pacific coast of Central America, including off Costa Rica, Panama, Guatemala, El Salvador, Honduras, and Nicaragua, and feeds off the West Coast of the United States and southern British Columbia

Humpback whales are distributed worldwide in all major oceans and most seas. They typically are found during the summer on high-latitude feeding grounds and during the winter in the tropics and subtropics around islands, over shallow banks, and along continental coasts, where calving occurs. Most sightings occur in the Strait of Juan de Fuca and in the San Juan Island area. Given their general migration patterns, this species is rare in the inland waters, but is expected to be more likely to occur in the warmer months (May through November). However, it is not expected to be present in the action area, nor to remain there for long time periods. No critical habitat rules have been published or designated for the humpback whale.

4.2.8 Southern Resident Killer Whale

NMFS listed the Southern Resident DPS as endangered under the ESA in November 2005 (70 FR 69903). This group of killer whales preys on fish of many species but predominantly feeds on salmon (Wiles 2004). The Southern Resident DPS contains three pods (J, K, and L pods).

The Southern Resident killer whale occurs in the inland waters of Washington and British Columbia. These whales regularly visit coastal sites off Washington State and Vancouver Island (Ford 1991) and are known to travel as far south as central California (Black 2011), but less is known of their offshore movements. Photo identification of individual whales through the years has resulted in a substantial understanding of this stock's structure, behaviors, and movements in inland waters. Southern Resident killer whales are most frequently observed in the inland waters of Washington State and British Columbia during the late spring, summer, and fall (Hanson and Emmons 2011). Studies on Southern Resident Killer whale home ranges using kernel density estimation and 50-95 percent percentage volume contours (PVC) indicated that whales are very rarely encountered within the Green Apple Project marine action area, and no portion of the action area was included in either the 50 or 95 percent PVC for the entire population's home range (Cominelli et al. 2018).

Pod sizes of Southern Resident killer whales range from approximately 20 in J and K pods to about 40 in L pod. The group sizes encountered can be smaller or larger if the matrilineal groups within the pods temporarily separate or the pods join together. The Center for Whale Research determined the Southern Resident Killer Whale population has dropped to 73 as of July 1, 2019 (Center for Whale Research 2019). Due to the scarcity of suitable Chinook salmon prey, this population of whales now rarely visit the core waters of its designated Critical Habitat: Puget Sound, Georgia Strait, and the inland reach of the Strait of Juan de Fuca (Center for Whale Research 2019).

Distribution of resident whales while in the inland waters of Washington and British Columbia correlates strongly with areas of greater salmon abundance. Whale sightings in Strait of Georgia are highly seasonal, although Southern Resident killer whales are generally sighted in all months of the year.

On November 29, 2006, NMFS designated critical habitat in Washington for Southern Resident killer whales (71 FR 69054). Southern Resident killer whale critical habitat includes the Summer Core Area (Haro Strait/Boundary Pass, Rosario Strait, and the San Juan Islands), Puget Sound, and the Strait of Juan de Fuca. The designation includes nearshore waters west of the refinery, and designated habitat is within the marine action area.

NMFS has designated primary constituent elements (PCE) of critical habitat designations for listed species under their jurisdiction, including the Southern Resident killer whales. PCEs for Southern Resident killer whales include elements protecting water quality, prey species, and passage conditions (detailed descriptions of PCEs for all species analyzed in this BA are included in Section 7). However, in-water sound levels are not currently a PCE of Southern Resident killer whale critical habitat.

5. Environmental Baseline

The environmental baseline includes the past and present impacts of all federal, state, or private actions and other human activities in the action area, the anticipated impacts of all proposed federal projects in the action area that have already undergone formal or early Section 7 consultation, and the impact of state or private actions that are contemporaneous with the consultation process (50 CFR 402.02). The baseline is described in terms of the habitat features and processes necessary to support life stages of the subject ESA species that may occur within the action area.

5.1 General Setting

Historically, the action area included conifer forests typical of the western hemlock (*Tsuga heterophylla*) forest zone in the Puget Sound lowlands (Franklin and Dyrness 1973). Most of these native conifer forests have been converted to residential, industrial, and commercial areas. The action area is limited to terrestrial habitats within 1,600 feet of the facility project site, terrestrial habitats within 1,200 feet of the mitigation sites, and nearshore marine habitats within 3 miles of the refinery dock, which are described further. A wetland delineation and habitat assessment were conducted by AECOM biologists on November 5-6, and December 3, 2018, and April 8-10, 2019 (AECOM 2019a). Project area ditches and wetlands are shown on Figure 5.

5.2 Terrestrial Habitat Conditions

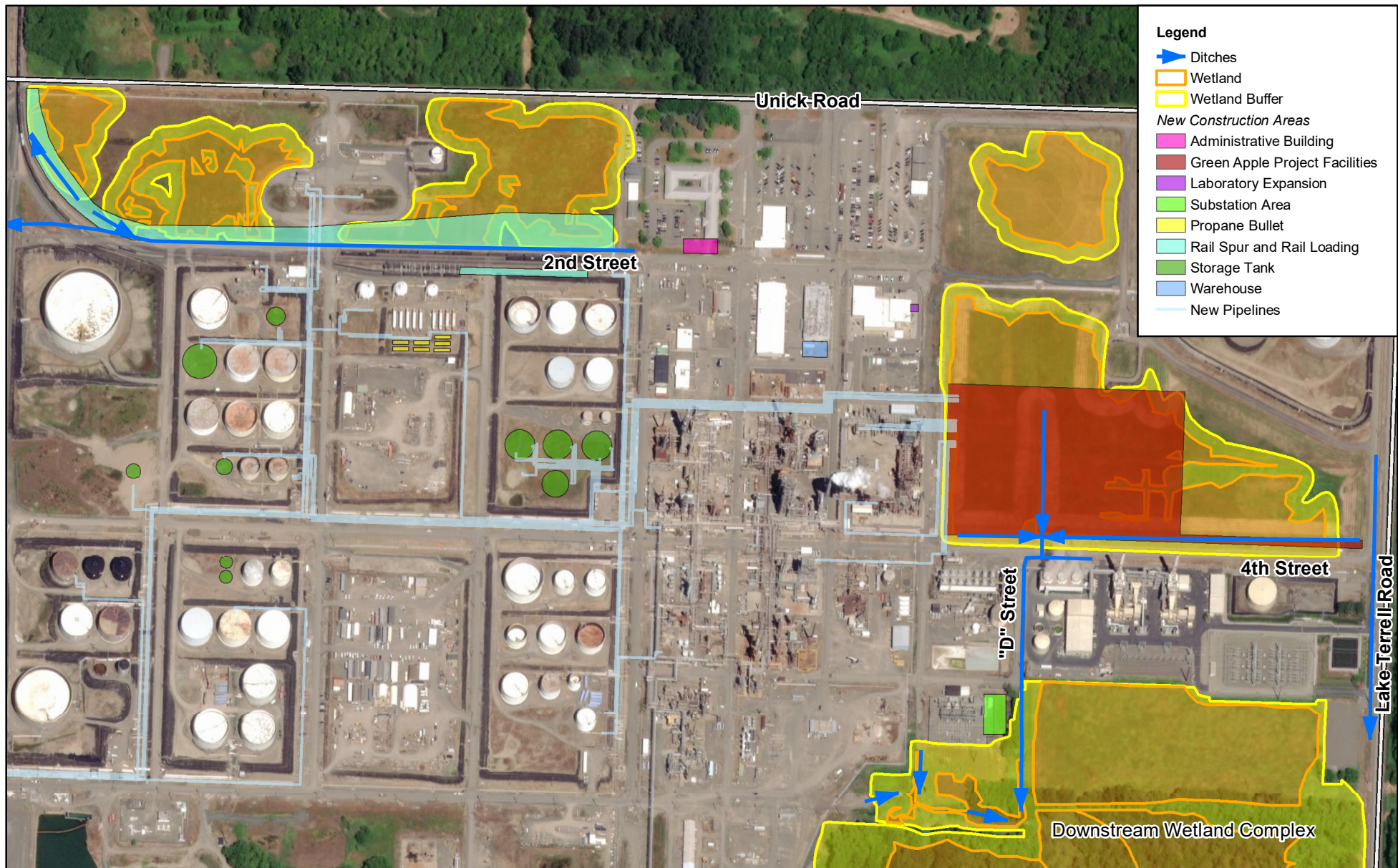
Terrestrial habitats in the action area are primarily developed industrial properties and degraded wetlands, as the Green Apple Project area is located within the boundaries of the existing Phillips 66 Ferndale Refinery. The project area includes an open field containing upland grasslands and occasionally ponded wetlands dominated by dense and invasive pasture grasses. These wetlands typically have low interspersions of habitat, low plant species diversity, and no special habitat features, resulting in a poor rating for wildlife habitat (AECOM 2019a).

Prior to the development of the land for industrial use, several farmsteads extended into the action area. However, aerial photography from 1943 to 1975 shows land use changing from agricultural to industrial, with many of the farm buildings becoming abandoned by the 1950s. The remaining structures that were located within the project area were likely razed by the subsequent land owner, General Petroleum Corporation, during the construction of the refinery in 1954 (AECOM 2019c).

Soils in the project area are primarily classified as Whitehorn silt loam, with small portions of Birchbay silt loam and urban land in the east and southwest portions of the project area, respectively (NRCS 2019). Whitehorn silt loam is a poorly drained soil that has slow permeability, with a seasonal water table at or near the surface. Ponding is likely in winter. Whitehorn silt loam is on the Natural Resources Conservation Service hydric soils list for Whatcom County.

Uplands within the project area contain mostly non-native grasses, including tall fescue, colonial bentgrass (*Agrostis capillaris*), velvet grass, sweet vernal grass, and red fescue (*Festuca rubra*). Non-native forbs include English plantain (*Plantago lanceolata*), bird's-foot trefoil, lesser hawkbit (*Leontodon saxatilis*), hairy cats-ear (*Hypochaeris radicata*), Queen Anne's lace (*Daucus carota*), Canada thistle (*Cirsium arvense*), and self-heal (*Prunella vulgaris*). Snowberry (*Symphoricarpos albus*) and Himalayan blackberry (*Rubus bifrons*) are also present in the uplands (AECOM 2019a). Figures 6, 7, and 8 are representative photos of terrestrial habitats.

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Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



DITCHES AND WETLANDS

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FIGURE 5



Figure 6. Proposed Renewable Fuel Production Facility Site (facing north)



Figure 7. Potential Supporting Infrastructure Site (facing east)



Figure 8. Proposed Rail and Truck Facilities Site (facing east)

The project area is located on a gently sloping glaciolacustrine terrace. Elevations range from 217 feet in the northeast corner to 193 feet in the southwest corner, with a slope gradient of generally 0-5 percent. Wetlands occur in concave depressions within the slope, and seasonal ponding can occur in the southern portions of the field.

Wetlands are dominated by non-native herbaceous plant species including tall fescue, bentgrass, reed canarygrass, velvet grass, red fescue, and bird's-foot trefoil. Native wetland species present include slough sedge, soft rush, field horsetail (*Equisetum arvense*), and Douglas aster (*Symphyotrichum subspicatum*) (AECOM 2019a). As previously described, the upland and wetland environments within the project area do not offer suitable habitat for any ESA-listed fish or wildlife species.

There are two ditches in the project area that drain into wetlands to the south of the refinery (Figure 5). One ditched stream is oriented north-south and drains into a culvert under 4th Street. The second ditch parallels 4th Street before also draining into the culvert under 4th Street. Ultimately, both ditches drain water into downstream wetlands located outside of the project area. These downstream wetlands are connected to Lummi Bay by an intermittent stream that flows through the wetlands, sometimes referred to as Onion Creek (AECOM 2019a). Although this intermittent stream is not within the action area, it is modeled as habitat for federally threatened Dolly Varden (*Salvelinus malma*)/bull trout as well as non-listed salmonids such as coho salmon (*Oncorhynchus kisutch*), winter steelhead, and resident cutthroat trout (*O. clarkii clarkii*) (WDFW 2019b).

While the intermittent stream south of the action area may provide habitat for fish, neither of the ditches in the action area are shown on the WDFW SalmonScape mapper, and during a wetland delineation and site visit by AECOM biologists they were assessed as not providing fish habitat (WDFW 2019a, 2019b; AECOM 2019a). The ditches are also separated from fish-bearing streams by several culverts and wetland complexes with only occasional ponding. Consequently, none of the ditch streams in the project area provide habitat for ESA-listed fish species under NMFS or USFWS jurisdiction.

A great blue heron (*Ardea herodias*) colony (breeding area) is located approximately 1 mile southwest of the project area (WDFW 2019a). WDFW management recommendations for great blue heron colonies (Larsen et al. 2004) include a maximum year-round buffer of 984 feet from the colony, and a maximum seasonal buffer of 3,280 feet for extremely loud land use activity (like blasting). Neither of these buffers intersects with the action area, and this heron colony will not be affected by the Green Apple Project.

Breeding areas for Yuma myotis (*Myotis yumanensis*, a species of native vesper bat), big brown bat (*Eptesicus fuscus*), and little brown bat (*Myotis lucifugus*) are mapped throughout the surrounding townships (WDFW 2019a). Roosting habitats, which are one of the most important habitats for Washington bats (Hayes and Wiles 2013), include suitable overhangs or cavities including caves, bridges, and snags. While there are many suitable roosting habitats, many populations in Washington preferentially roost in the cavities and crevices found in trees and snags (Hayes and Wiles 2013). No bat breeding areas occur in the action area, as no appropriate habitat (trees, snags, or caves) are present.

Other terrestrial habitats include biodiversity areas and corridors north of the refinery along the coast, waterfowl concentrations in Lummi Bay, and trumpeter swan (*Cygnus buccinator*) habitats east of the refinery (WDFW 2019a). The biodiversity areas and corridors north of the refinery contain steep bluffs with forested crests and many large perch trees. These areas are often used by bald eagles (*Haliaeetus leucocephalus*) when foraging, and by peregrine falcons (*Falco peregrinus*) in winter. Additionally, a large variety of shorebirds, waterfowl, and seabirds use the inland waters of Lummi Bay (WDFW 2019a). Trumpeter swans also are present in the region, and utilize farm fields approximately 0.6 mile to the east of the refinery for feeding and loafing during winter months (WDFW 2019a).

5.3 Marine Habitat Conditions

The major water feature in the action area is the Strait of Georgia, which includes nearshore intertidal, nearshore subtidal, and deep water habitats (WDFW 2019a). In addition, estuarine and marine wetlands are mapped 2.5 miles north of the refinery docks (WDFW 2019a).

5.3.1 Physical Indicators

5.3.1.1 Physical Structures

Developed marine habitats in the action area include developed shoreline with docking facilities for large vessels and shoreline residential areas on the Sandy Point Peninsula. Developed areas in the immediate vicinity of the refinery include shoreline reinforced by riprap rock structures surrounding the docking facilities. Industrial facilities associated with loading/offloading vessels servicing the refinery are located just onshore.

The deep-water docking facilities extend for approximately 1,800 feet into the Strait of Georgia to allow large Panamax class vessels to unload materials at the refinery. The dock is paved to the end of the pier, with piping running along the dock to offload materials from ships servicing the refinery.

5.3.1.2 Existing Vessel Traffic

Overall, the refinery received 49 shipments of crude oil in 2018, averaging 278,212 bbl per delivery (ERM 2019). The largest single delivery was more than 396,000 bbl. The refinery generated 349 outbound shipments of multiple refined products, averaging 43,919 bbl per shipment. The largest single shipment (including all materials shipped) was nearly 150,000 bbl. Many shipments included more than one product. Most deliveries to the refinery consisted of Alaska North Slope crude oil. Ports or terminals within the Salish Sea (listed as Puget Sound, Strait of Georgia, or Other) accounted for approximately 78 percent of outbound vessel trips and approximately 58 percent of shipped volume. A photo of the refinery dock is provided as Figure 9. Details on vessel traffic and impacts on transportation from the proposed project are described in the Green Apple Transportation Study (ERM 2019).



Figure 9. Phillips 66 Ferndale Refinery (date unknown). Photo courtesy of Phillips 66.

5.3.1.3 Ambient Underwater Sound

Ambient sound is a composite of sounds from multiple sources, including environmental events, biological sources, and anthropogenic activities. Physical noise sources include waves at the surface, precipitation, earthquakes, ice, and atmospheric noise, among other events. Biological sources include marine mammals, fish, and invertebrates. Anthropogenic sounds are produced by vessels (small and large), dredging, aircraft overflights, construction activities, geophysical explorations, commercial and military sonars, and other activities. Known noise levels and frequency ranges associated with vessel noise sources similar to those that would occur during construction and operation of this project are summarized in Table 2. During a 20-month period from February 2016 to October 2017, average ambient noise levels near Lime Kiln State Park on San Juan Island along the Haro Strait were approximately 117-125 decibels (dB) referenced to 1 micropascal (dB re 1 μ Pa) (Port of Vancouver 2017). Ambient noise levels in areas similar to the action area range between 115 dB and 135 dB (Table 3).

Table 2. Representative Levels of Underwater Vessel Noise Sources

Noise Source	Frequency Range (Hz)	Source Level	Reference
Small vessels	860–8,000	141–175 dB RMS re: 1 μ Pa at 1 meter	Galli et al., 2003; Matzner & Jones 2011; Sebastianutto et al., 2011
Large ship	20–1,000	176–186 dB re: 1 μ Pa ² sec SEL at 1 meter	McKenna 2011
Tug docking gravel barge	200–1,000	149 dB at 100 meters	Blackwell and Greene 2002

Key: dB = decibel; Hz = Hertz; RMS = root mean square; sec = second; SEL = sound exposure level
dB re 1 μ Pa = decibels (dB) referenced to (re) 1 micro (μ) Pascal (Pa)

Table 3. Ambient Underwater Noise Levels at Various Open Water Locations in the Western U.S.

Environment	Location	Ambient Noise Levels
Open ocean	Central California coast	74 – 100 dB
Large marine bay, offshore, heavy commercial, and recreational boat traffic	Monterey Bay, California	113 - 116 dB
Large marine inlet and some recreational boat traffic	Hood Canal, Washington	115 – 135 dB
Large marine bay, heavy industrial use, and boat traffic	San Francisco Bay – Oakland outer harbor	120 – 155 dB
Marine surf	Fort Ord beach, California	138 dB
Large marine bay and heavy commercial boat traffic	Elliot Bay – Puget Sound, Washington	147 – 156 dB

Source: Caltrans 2009

Key: dB = decibel

5.3.1.4 Substrate and Slope

Substrate on the beach above MLLW is a mix of gravel and cobble. Some riprap and hardened shoreline occur where the shoreline meets the refinery dock. The substrate below MLLW is primarily sand and silt, with portions of shell fragments in offshore areas.

5.3.1.5 Flows and Currents

The tidal range (difference between MHHW and MLLW) in the vicinity of the refinery dock, according to the Cherry Point Gauge reference station, is approximately 9.15 feet (NOAA 2019). Tidal currents dominate nearshore portions of the action area. The Washington State Coastal Atlas identifies the drift cell movement from left to right (north to south) (Ecology 2019a).

5.3.2 Chemical Indicators

5.3.2.1 Water Quality

The marine waters immediately offshore in the Strait of Georgia have been listed as Category 1 (Meets Tested Criteria – Meets State water quality standards) for arsenic and temperature parameters, and Category 2 (Water of Concern – Some evidence of water quality problem, but not enough to show persistent impairment) for dissolved oxygen (DO)(Ecology 2019b). The Category 2 DO listing may be due to the natural upwelling of low oxygen waters off the coast of Washington (Ecology 2019b).

5.3.2.2 Sediment Quality

The developed shoreline within the action area is industrialized with commercial uses along the waterfront and residential areas to the south on the Sandy Point Peninsula. It is expected that offshore sediments contain low levels of pollutants associated with runoff from these sources. Based on the results of sediment testing conducted in 2004, Ecology determined that one sediment sample in the immediate area of the refinery exceeded the Sediment Management Standards Cleanup Screening Level chemistry criterion, warranting a listing as a Category 2

sediment (Requires Further Monitoring - Some evidence of sediment quality problem, but not enough to show persistent impairment) (Ecology 2018a).

5.3.3 Biological Conditions

5.3.3.1 Kelp and Eelgrass

Patchy kelp and eelgrass (*Zostera* spp.) fringes occur along the shoreline immediately offshore from the Phillips 66 Ferndale Refinery. Additionally, a large bed of patchy eelgrass is mapped throughout Lummi Bay (Ecology 2019a). Kelp and eelgrass beds provide habitat for marine fish species, invertebrates, marine mammals, and birds; aid in erosion prevention; and maintain shoreline stability. Seagrasses, like eelgrass, are often used as indicator species, due to their rapid reaction to changes in water quality (Ecology 2019a).

5.3.3.2 Marine Invertebrates

Invertebrates are integral in the structure, health, and functioning of intertidal habitats of Puget Sound. For example, some intertidal invertebrates hold important positions in detrital food chains. Several populations of marine invertebrates occur in the vicinity of the action area. Dungeness crab (*Metacarcinus magister*) has a mapped occurrence throughout and beyond the action area (WDFW 2019a). Pinto abalone (*Haliotis kamtschatkana*) occurs southwest of Lummi Point (WDFW 2019a). This species has experienced sharp declines in recent decades, but populations are not present in the action area. Red sea urchin (*Mesocentrotus franciscanus*) are also present approximately 4 miles southwest of the refinery dock. Additionally, a geoduck (*Panopea generosa*) population is present approximately 5 miles west of the refinery (WDFW 2019a).

5.3.3.3 Fish

The distribution and abundance of fish depends greatly on the physical and biological conditions of the marine environment, such as salinity, temperature, DO, population dynamics, predator and prey interaction oscillations, seasonal movements, reproduction strategy, life length, and recruitment success (Helfman et al. 2009). Puget Sound is home to 253 fish species (Pietsch and Orr 2015).

Non-Listed Salmonid Species

Non-ESA-listed salmonids that occur within the action area include fall-run chum salmon (*Oncorhynchus keta*), coho salmon, pink salmon (*O. gorbuscha*), and coastal cutthroat trout. Sockeye salmon (*O. nerka*) are also present within Lummi Bay. Pink salmon are the most numerous of the nearshore salmonid species in odd years, which corresponds to the species' dominant biennial spawning (during odd years) in Puget Sound rivers and large hatchery releases in March. Chum salmon are the most numerous species in even years, followed by coho salmon. Cutthroat trout are uncommon, and steelhead trout rarely observed.

Forage Fish Species

Forage fish in the Strait of Georgia consist of a variety of small schooling fish, which are major food items for many species of fish, birds, and marine mammals, including ESA-listed species. In addition, several species are subject to commercial and recreational fisheries (Bargmann 1998). Primary forage fish in the Strait of Georgia are Pacific herring (*Clupea pallasii*), surf smelt (*Hypomesus pretiosus*), and Pacific sand lance (*Ammodytes hexapterus*). Other forage fish present in smaller numbers are Northern anchovy (*Engraulis mordax*), Pacific sardine (*Sardinops sagax*), eulachon, longfin smelt (*Spirinchus thaleichthys*), and other species of smelt (Osmeridae). Surf smelt and Pacific herring spawning habitat are mapped in the action area (WDFW 2019a).

5.3.3.4 Marine Mammals

The nearshore provides habitat for a variety of marine mammals. Marine mammals that could potentially occur within the action area include harbor porpoise (*Phocoena phocoena*), harbor seal (*Phoca vitulina*), and California sea lion (*Zalophus californianus*). Harbor porpoises are considered the most abundant cetacean in the inner marine waters of Washington State, including those in the action area. A 2014 WDFW summary report indicated that there

were 0.415 porpoises per square kilometer in the Washington Puget Sound study area (which includes the action area), and that porpoise densities were increasing by 9.8 percent per year (WDFW 2016).

Harbor seals are, the most common pinniped in the inland marine waters of Washington, occur in the action area year-round. California sea lions breed on islands off of Baja Mexico and southern California. Males, primarily, migrate north, including to the inland waters of Washington. The two closest documented harbor seal haulout sites—one approximately 4.5 miles southeast of the refinery dock in Lummi Bay and another approximately 6 miles northwest of the refinery at Point Whitehorn—each contain fewer than 100 individuals. However, there are several haulout sites among the Sucia Islands, Matia Island, and Patos Island approximately 9 miles southwest of the refinery that each contain over 100 individuals of various species (WDFW 2000).

6. Effects Analysis

This section analyzes direct and indirect effects of the action on listed species, their habitats, and critical habitats, together with the effects of other activities that are interrelated or interdependent with the action that are added to the environmental baseline (50 CFR 402.2).

For listed species, the potential for an individual of a species to be exposed to a stressor was evaluated in conjunction with the severity of the stressor and the status of existing baseline conditions. For designated critical habitats, the effect of the stressor on each PCE present in the action area was evaluated. A conclusion about the effect was made for each listed species and critical habitat based on the analysis, using the following terms: beneficial, insignificant, or discountable, as defined by NMFS (2014):

- Beneficial effects have an immediate positive effect without adverse effects to the species or habitat.
- Insignificant effects relate to the size or severity of the impact and include those effects that are undetectable, not measurable, or so minor that they cannot be meaningfully evaluated.
- Discountable effects are those that are extremely unlikely to occur. For an effect to be discountable, there must be a plausible effect (i.e., a credible effect that could result from the action and that would be an adverse effect if it did impact a listed species), but it is very unlikely to occur.

This section describes general effects on fish and wildlife species from construction and operation of the project and then focuses on ESA-listed species-specific effects.

6.1 Direct Effects from Construction of the Project

Potential direct effects on ESA-listed fish and wildlife species from construction include habitat modification, displacement, noise disturbance, and water quality.

6.1.1 Habitat Modification

Construction of the project would include 12.61 acres of direct permanent impact, and 3.0 acres of direct permanent wetland buffer impact. Given the high density of wetland habitats within the refinery, wetland impacts are unavoidable. However, high-quality forested wetlands would be avoided, and wetland impacts would be limited to wetlands rated as low quality.

Development of the Green Apple Project would also entail the creation of approximately 768,000 square feet of new impervious surfaces, and approximately 130,000 square feet of redeveloped impervious surfaces. Stormwater from these surfaces would be routed to existing stormwater systems and facilities and a new on-site stormwater management system. Water entering existing stormwater facilities would be treated and discharged into the Strait of Georgia, and it is anticipated that water entering the new on-site stormwater management system would follow existing flowpaths to Lummi Bay via an unnamed, seasonal stream.

The Green Apple Project would include compensatory wetland mitigation to offset unavoidable wetland impacts. As previously described, wetland mitigation is currently in the conceptual design phase. Construction would

include modification of habitat that was historically degraded through drainage, cultivation, and grazing through restoring wetland and buffer vegetation and rehabilitating wetland hydrology.

Potential direct impacts from construction of the mitigation site would include displacement of wildlife, disturbance associated with construction noise, and alteration of water quality, as described further in the sections that follow.

6.1.2 Displacement

Construction would result in an increase in human activity and visual disturbance that could disrupt movement and foraging opportunities of wildlife that happen to be traveling through the project area. Wildlife such as bald eagles exhibit greater sensitivity to disturbance when construction activities occur within full view of the wildlife (Grubb and King 1991), and visual or sound disturbance from recreational or commercial watercrafts is known to elicit behavioral responses in murrelets of all age classes (McShane et al. 2004). It was determined that the limit of visual disturbance would be no more than 500 feet from the facility and mitigation site construction zones.

6.1.3 Construction Airborne Noise

Construction noise may cause wildlife to move away from the construction zone. Airborne noise generated during construction would extend approximately 1,600 feet from the Green Apple facilities project area, and 1,200 feet from the mitigation construction sites (the extent of the terrestrial action area described in Section 3.1). It is expected that mobile wildlife and birds would temporarily relocate to nearby areas during construction, and that foraging would not be substantially limited. Ground disturbance related to vegetation clearing, heavy equipment staging, laydown of materials, and soil piling could result in the incidental mortality of individual small mammals that have limited mobility or occupy burrows (Trombulak and Frissell 2000). Construction noise from the mitigation site at Wetland NN may encroach on shoreline habitats but would not likely extend to deeper water habitats where marbled murrelets may forage.

6.1.4 Water Quality

Reduction in water quality may occur as a result of construction activities in the vicinity of ditches in the project area due to increased turbidity associated with sedimentation from construction sites. However, ditches in the project area are non-fish-bearing. Although the ditches do flow into downstream wetlands to the south of the refinery, effects to these wetlands would be avoided by the use of appropriate construction BMPs implemented under SWPPPs, such as silt fencing and temporary stormwater ponds.

Construction of the Green Apple Project would also result in the creation 768,000 square feet of new impervious surfaces, and approximately 130,000 square feet of redeveloped impervious surface. There would be a resultant increase in the amount of stormwater runoff generated by the refinery facilities. Stormwater would be routed to the refinery's existing stormwater system, the existing Phillips 66 WWTP, and a new on-site stormwater management system that would be designed in accordance with Whatcom County Development Standards and the 2014 Ecology SWMMWW. The Phillips 66 Ferndale Refinery's existing National Pollutant Discharge Elimination System (NPDES) discharge permit (#WA0002984) would be revised to account for the additional stormwater. The treated stormwater would eventually flow into the Strait of Georgia, in accordance with the Phillips 66 Ferndale Refinery NPDES discharge permit. It is anticipated that treated stormwater discharge from a new stormwater management system would follow current flowpaths to the large wetland complex outside the project area that is connected to Lummi Bay via an unnamed, seasonal stream.

Increased vessel traffic would inherently increase use of the refinery's deep-water dock. Because vessels would be calling at a deep-water dock, no turbidity is anticipated. Consequently, no reduction in marine water quality from routine operation of the new facilities would be anticipated.

6.2 Indirect Effects from Operations of the Project

Indirect effects are defined as effects that are reasonably likely to occur at some point after project completion, and include effects associated with project operations. The operation of the Green Apple Project would increase the number of vessels calling at the refinery and would increase the number of cars attached to manifest trains calling at the refinery.

6.2.1 Marine Vessel Traffic

Vessel traffic associated with the refinery would generate 143 vessel movements per year under anticipated traffic volumes once the Green Apple Project is operational (ERM 2019). The largest of these vessels would be Panamax class vessels, although barges and articulated barges would also call at the refinery. A transportation study completed for the project indicated that vessel activity could increase by up to 2.5 percent in Strait of Georgia, Haro Strait, and Boundary Pass, and by as much as 12.3 percent in Rosario Strait if all project vessels were to travel each of those waterways exclusively (ERM 2019). However, Rosario Strait would only typically be used for shipments between the refinery and Puget Sound, which would likely represent only a small fraction of project vessel activity (ERM 2019).

6.2.1.1 Whale Strikes

Collision events from vessels represent a potential impact to ESA-listed Southern Resident killer whales and other marine mammals. Consequently, an increase in vessel traffic necessarily increases the risk of collision with marine mammals. However, these events are extremely rare. For example, only six collision events between vessels and killer whales in the Pacific Northwest were documented between 1990 and 2008 (NMFS 2008).

The probability that collision of a whale with a vessel would cause a fatal or serious injury increases with speed. Whales struck by vessels traveling at speeds less than 13 knots are more likely to survive than when struck by a vessel traveling at speeds greater than 13 knots (Dolman et al. 2006). Collisions between vessels and whales are associated with a wide variety of vessels (size and class). Shipping vessels and tugboats usually proceed in a predictable straight path at relatively low speeds and are likely detected and avoided by Southern Resident killer whales (NMFS 2008).

Implementation of vessel-operating procedures and marine mammal protections outlined in Section 2.5.3, such as vessel slowdown procedures when approaching a whale, would reduce the risk of whale strikes.

6.2.1.2 Spills

Increased vessel traffic servicing the refinery would increase the risk of spills in the vicinity of the refinery, which could have far-reaching impacts. Due to the inherently confined nature of the marine waters of the Salish Sea, a large oil spill has the potential to reach shorelines much more quickly than a similar spill in the open ocean (Ecology 2011). Marine nearshore waters are much more productive than the open ocean, and such a spill could impact a variety of species, including ESA-listed species addressed in the assessment.

Oil can impact a variety of species through contact, ingestion, inhalation, and absorption. Plankton can become contaminated from contact to oil and can in turn contaminate any species that consume plankton like fish, marine mammals, and scavengers or predators who might eat infected fish species. Aside from ingestion, oil contact can also have impacts on birds and some marine mammals by reducing or eliminating their ability to dive, fly, or float on the water, which can lead to drowning. Oil can prevent birds and marine mammals from thermoregulating, as their feathers or fur can lose its impermeability to water upon contact with oil. Fish and shellfish can become negatively impacted by respiring or filtering oil-contaminated water, and shellfish can become particularly impacted when oil becomes concentrated along shorelines. Oil also has the potential to persist in the environment and can be detected in marine sediments decades after a spill event (Wirwa 2010).

While the consequence of a major oil spill can be substantial, the risk of an oil spill occurring is relatively low. Green Apple would implement multiple different strategies to minimize the risk of spills, including a collection of established physical and procedural elements. Physical elements would include engineered safety features, such as

vessel construction with various physical barriers and containments (particularly double hulls for tankers), as well as automatic controls, redundancy, and warning systems. Procedural elements would include personnel training, rules and procedures, training, drills, administrative controls, and oversight and enforcement (Michael and Winslow 2000).

While the risk of a spill occurring as a result of this proposal is relatively low, numerous plans have been established to coordinate spill cleanup and control efforts. Control of spills from vessel operation is largely controlled by the USCG. Response to spills in Washington State is coordinated by the Ecology Spill Prevention, Preparedness, and Response Program (Ecology 2018b), which includes the following elements:

- Review and approve spill contingency plans maintained by operators to assure that plan holders and spill response contractors maintain their readiness through scheduled and unannounced drills
- Maintain partnerships with other agencies to maintain a regional contingency plan that guides how spills are managed in the Northwest
- Develop and update Geographic Response Plans (GRPs) in consultation with other natural resource experts and communities
- Inspect facilities, vessels, and oil-handling facility transfers
- Rapidly respond to and clean up oil and hazardous material spills
- Restore public natural resources damaged by oil spills

A GRP has been developed for the San Juan Islands/North Puget Sound, which includes the project location (Ecology 2003). The GRP is intended to help the first responders to a spill and serves as the federal and state on-scene coordinators' "orders" during a spill.

All response strategies fall into one of three major techniques that may be utilized either individually or in combination: dispersants, in situ burning, and mechanical recovery and protection strategies. In the event of a release, it is unlikely that conditions would be appropriate for dispersants or in situ burning. When in situ burning or dispersants are not appropriate, key mechanical recovery strategies are skimming and use of collection, diversion, or exclusion booms to contain and recover the oil. These measures prevent oil from entering areas with sensitive wildlife and fisheries resources. Skimming would be used whenever possible and is often the primary means of recovering oil and protecting resources, especially when booming is not possible or feasible.

The GRP identifies geographic areas where spills are likely to occur; sensitive resources that would likely be impacted within the initial hours of the spill; and booming strategies for each of the potential spill origins based on the sensitivity of resources, feasibility, etc. Control and containment at the source offer the best opportunity to reduce adverse environmental impacts (NOAA 2013).

Phillips 66 maintains an ICP for the refinery. This ICP incorporates, and is intended to meet, regulations regarding oil and dangerous waste spill prevention, emergency actions, and contingency planning. If it is determined that Green Apple is a new stand-alone company that is deemed a "Class 1 facility" [as defined by WAC 173-180-025(8)], a facility-specific ICP would be developed in accordance with Ecology and EPA requirements. Also, a facility-specific Oil Spill Prevention Plan and an Operations Manual would be developed in accordance with Ecology and EPA requirements. Lastly, a written Training and Certification Program that addresses all oil-handling personnel and Persons-in-Charge (PICs) at the facility/dock would be developed in accordance with Ecology requirements. If it is determined that Green Apple will be deemed an expansion of the existing Phillips 66 Ferndale Refinery (which is already operating as a Class 1 facility) and not a new stand-alone company, the Phillips 66 Ferndale Refinery would revise their already approved ICP, Oil Spill Prevention Plan, Operations Manual, and written Training & Certification Program.

6.2.1.3 Underwater Vessel Noise

Impacts of underwater vessel noise on marine mammals include behavioral changes in foraging and masking effects. Masking occurs when one sound, distinguished as the "noise," interferes with the detection or recognition of another sound. The quantitative definition of masking is the amount in dB an auditory detection or discrimination threshold is raised in the presence of a masker (Erbe et al. 2016). Masking can effectively limit the

distance over which a marine mammal can communicate, detect biologically relevant sounds, and echolocate (odontocetes). Masking only occurs in the presence of the masking noise and does not persist after the cessation of the noise. Masking can lead to vocal (e.g., Lombard effect, or increasing amplitude or changing frequency) and behavior changes (e.g., cessation of foraging, leaving an area) to both signalers and receivers, in an attempt to compensate for noise levels (Erbe et al. 2016). Masking is more likely to occur in the presence of broadband, relatively continuous noise sources such as vessels and vibratory pile driving.

Williams et al. (2014) found that in median noise conditions in Haro Strait, killer whales lose 62 percent of their acoustic communication space due to vessel traffic noise, and in peak traffic hours lose up to 97 percent of that space. Holt et al. (2008; 2011) showed that Southern Resident killer whales in the waters surrounding the San Juan Islands increased their call source level as vessel noise increased.

Although one study found that humpback whales did not change the frequency or duration of their vocalizations in the presence of ship noise, their source levels were lower than expected based on source level changes to wind noise, potentially indicating some signal masking (Dunlop 2016).

Implementation of the vessel-operating procedures and marine mammal protections outlined in Section 2.5.3 would reduce the effects of noise generated by vessels on marine mammal foraging and masking.

6.2.2 Rail Traffic

Rail traffic to the refinery would increase by the addition of more rail cars to existing manifest trains. However, it is likely that the increase in rail cars would be incorporated into existing manifest trains, with no net increase in the number of inbound and outbound train trips (ERM 2019). Consequently, rail traffic associated with the Green Apple Project would not have effects beyond what is already established at the Phillips 66 Ferndale Refinery.

Rail spills can occur throughout a variety of habitats due to the extensive and linear nature of railroad systems. These include cities, rural communities, sensitive environments, and numerous waterbodies (Ecology 2017). Consequently, the effects of a rail spill can be just as varied as the environments rail systems cross. Effects on wildlife from rail spills are similar to those in marine environments but can occur in terrestrial and freshwater habitats. Oil can impact a variety of species through contact, ingestion, inhalation, and absorption. Animals can directly ingest oils or can ingest infected prey. Contact with oil can reduce or eliminate a bird's ability to dive, fly, or float on the water, which can lead to drowning. Oil can also prevent birds and mammals from thermoregulating, as their feathers or fur can lose their impermeability to water upon contact with oil, potentially leading to hypothermia. Fish and shellfish can also become negatively impacted by respiring or filtering oil-contaminated water. Oil also has the potential to persist in the environment and can be detected in sediments decades after a spill event (Wirwa 2010).

Rail spills do occur but are extremely rare, and numerous safety requirements are in place to address the potential for such spills. Specific railroad safety requirements related to the carriage of hazardous materials are outlined in the Transportation Title of the Code of Federal Regulations, 49 CFR, Parts 171-174 and 178-180. These regulations address specific actions, including emergency response and regulations regarding the design of railroad tank cars, which must be followed by railroads. They also include incident-reporting requirements, as well as preventative measures, such as those pertaining to the manner in which hazardous materials are contained, the manner in which employees are trained, and the way in which rail cars must be handled.

In addition, 49 CFR Parts 200-299 regulate the operation of trains, identify minimum safety standards for track and equipment (and set higher minimum standards for tracks over which hazardous materials are transported), and identify reporting requirements (in addition to the reporting requirements in 49 CFR Parts 171-180). If a spill occurs during rail transit, the railroads must notify the National Response Center, the State Emergency Management Division, and the appropriate regional office of Ecology.

The rail line to Green Apple crosses numerous streams and wetlands on fill, bridges, and trestles. Bridges and trestles are addressed by management programs under the Rail Safety Improvement Act of 2008, which include inspection and maintenance programs. Spills at locations where water resources may be impacted are subject to higher inspection and maintenance requirements and may be considered somewhat less likely than on other

portions of the rail line. If a spill occurs during over-water transfers of product, the ICP would be followed, which would limit impacts and provide for adequate analysis and mitigation of potential adverse impacts in accordance with RCW 43.21C.240. Ecology and the USCG would be notified to oversee and assist with containment.

According to the Association of American Railroads (2008), 99.998 percent of rail shipments involving hazardous materials are completed without a release caused by train accident. Overall, the risk of spill of oil or other materials during rail transit that could occur as a result of this proposal is relatively low.

6.2.3 Truck Traffic

Delivery of renewable feedstock and shipment of renewable fuels during operation of the Green Apple project would result in increased vehicular trips by commercial trucks resulting in a projected average of five loaded trucks per day, assuming 9,000 gallons per truck. Truck traffic associated with other minor chemical deliveries, hauling of waste materials, and renewable product transport would result in an additional five to six loaded trucks per day on average. Consequently, the incremental increase in truck traffic associated with the Green Apple Project would not have effects beyond what is already established at the Phillips 66 Ferndale Refinery.

6.2.4 Wetland Mitigation

Although there would be short-term direct impact to general wildlife species from construction noise and habitat modification during wetland mitigation construction, the rehabilitation and enhancement of wetland habitat would result in indirect, beneficial effects over the long-term. As described in the Conceptual Mitigation Plan (AECOM 2019b), the mitigation approach would include rehabilitation and enhancement of wetland and buffer vegetation that has the potential to benefit amphibians, waterfowl, and other wildlife species, and to improve water quality functions. A monitoring and maintenance plan would be implemented to ensure the mitigation site achieves site-specific goals, objectives, and performance standards.

6.3 Species-Specific Effects

The discussion of effects is organized into two categories: direct effects that may take place during construction (construction impacts) and indirect effects that may take place later in time during operation of the Green Apple Project (operational impacts).

6.3.1 Bull Trout

Potential effects on bull trout from this project are limited to operational impacts from increased vessel traffic.

6.3.1.1 Construction Impacts

No in-water construction is proposed.

6.3.1.2 Operational Impacts

Vessel Traffic

Increased vessel traffic may impact bull trout in the action area through the associated increase in underwater noise. Underwater noise could cause temporary behavior changes in adult fish by eliciting a startle response, disrupting feeding, or potentially causing avoidance of an area (WSDOT 2019). Potential effects would be limited to nearshore areas, as bull trout do not typically use offshore marine areas.

Although the increase in vessel traffic would be permanent, the 143 annual vessel movements represent less than one vessel trip (either inbound or outbound) every other day and each noise event would be short in duration. Therefore, it is expected that the increase in vessel noise associated with operation of the project would cause slight periodic alteration of background noise levels.

Spills

An increase in vessel traffic inherently increases the likelihood of a spill incident in the action area. Spills can impact fish species in several ways. Toxins from oil can directly enter the blood through the gills during respiration, potentially killing the fish. Ingestion of oil can kill fish through direct ingestion or through the ingestion of infected prey species. Adult fish can experience reduced growth, increased liver size, changes in respiratory and circulatory function, and reduced reproductive success after exposure to oil. Oil can also impact reproduction by decreasing the viability of eggs and juvenile fish (Wirwa 2010). However, the likelihood of spills occurring is low. Additionally, BMPs such as double hulls for tankers, automatic controls, and redundancies, as well as procedural elements such as personnel training, rules and procedures, and training would all further decrease risks associated with spills (Michael and Winslow 2000).

Potential Effects to Prey

Bull trout prey including Pacific herring and surf smelt spawning are documented in the action area. Potential effects on prey species (fish) would be similar to operational impacts previously described for bull trout and considered insignificant.

6.3.2 Oregon Spotted Frog

Potential direct effects on the spotted frog from the project are limited to the potential loss of habitat associated with the wetland impacts of the project. However, wetland habitats within the action area are degraded, only occasionally ponded, and do not provide suitable habitat for Oregon spotted frogs. Therefore, the project would have no effect on the Oregon Spotted Frog.

6.3.3 Marbled Murrelet

Potential direct effects on the marbled murrelet from the project are limited to in-air noise generated during construction. Indirect effects are limited to those associated with increased vessel traffic and displacement effects from increased vessel presence in foraging areas offshore.

6.3.3.1 Construction Impacts

Construction in the action area could elicit a behavioral response from marbled murrelets, such as avoidance of the area. However, it is unlikely that marbled murrelets would be present during construction. Terrestrial habitats surrounding the refinery are considered Class 1 (lowest) to Not Habitat Capable for murrelets in the project area under the Northwest Forest Plan (Raphael et al. 2011). Construction noise is not expected to travel further than 1,600 feet from the Green Apple Facilities project site and 1,200 feet from the wetland mitigation sites (see Section 3.1), and therefore would not reach the marine foraging habitats of the marbled murrelet. The extent of construction noise for the mitigation site at Wetland NN may encroach on shoreline habitats, but would not likely extend to deeper water habitats where marbled murrelets may forage.

The average estimated 2012 population density of marbled murrelets was less than one bird per square kilometer at the nearest sampling unit around the Sucia Islands (Falxa and Raphael 2016), and the estimated 2016 population density for Zone 1 of the Marbled Murrelet Effectiveness Monitoring program was 1.319 bird per square kilometer (Pearson et al. 2018), indicating little use of the action area by marbled murrelets.

6.3.3.2 Operational Impacts

Vessel Traffic

Increased vessel traffic in the action area could elicit a behavioral response or avoidance of the area by marbled murrelets. There are no currently established underwater noise thresholds for marbled murrelets from sources other than impact pile driving. An increase in vessel traffic due to operation could lead to increases in low-frequency noise and displacement, but these increases would only occur when individual vessels are calling at the refinery and would be slight, periodic, and temporary in nature.

Vessels can also have an above-water effect on murrelets. In-air noise from vessels can vary widely depending on the vessel, potentially reaching levels where murrelets would be displaced or temporarily leave the area. However, like underwater noise, in-air noise increases due to vessel traffic would only occur when individual vessels call at the refinery and are expected to be slight, periodic, and temporary in nature.

Likelihood of Spills

An increase in vessel traffic inherently increases the likelihood of a spill incident in the action area. Spills can impact birds in several ways. Oil, including animal fats and vegetable oils (Ecology 2017), can coat feathers and prevent diving, floating, and flying, which can lead to drowning. Ingestion of oil can kill birds through direct ingestion or through the ingestion of infected prey species. Additionally, inhalation of oil can kill birds (Wirwa 2010). However, the likelihood of spills occurring is low. Additionally, BMPs such as double hulls for tankers, automatic controls, and redundancies, as well as procedural elements such as personnel training, rules and procedures, and training would all further decrease risks associated with spills (Michael and Winslow 2000).

Potential Effects to Prey Species

Marbled murrelet prey including Pacific herring and surf smelt spawning are documented in the action area. Potential effects on prey species (fish) would be similar to operational impacts previously described for bull trout and considered insignificant.

6.3.4 Chinook Salmon and Steelhead

Potential direct effects on Chinook salmon and steelhead (listed salmonids) from the Green Apple Project would be limited to increases in underwater noise from increased vessel traffic, an increased likelihood of spills, and potential effects on prey species.

6.3.4.1 Construction Impacts

No in-water construction is proposed.

6.3.4.2 Operational Impacts

Vessel Traffic

Increased vessel traffic may impact listed salmonids in the action area through the associated increase in underwater noise. Effects on Chinook salmon and steelhead would be limited to the nearshore area, as adult and juveniles may be migrating. Although the increase in vessel traffic would be permanent, the 143 annual vessel movements would represent less than one vessel trip (either inbound or outbound) every other day, and each noise event would be short in duration. Therefore, it is expected that the increase in vessel traffic associated with operation of the project would cause a slight, periodic alteration of background noise levels.

Likelihood of Spills

Potential effects due to a spill are similar to those described for bull trout. Toxins from oil can directly enter the blood through the gills during respiration, potentially killing the fish. Ingestion of oil can kill fish through direct ingestion or through the ingestion of infected prey species. Adult fish can experience reduced growth, increased liver size, changes in respiratory and circulatory function, and reduced reproductive success after exposure to oil. Oil can also impact reproduction by decreasing the viability of eggs and juvenile fish (Wirwa 2010). However, the likelihood of spills occurring is low. Additionally, BMPs such as double hulls for tankers, automatic controls, and redundancies, as well as procedural elements such as personnel training, rules and procedures, and training would all further decrease risks associated with spills (Michael and Winslow 2000).

Potential Effect to Prey

Chinook salmon feed primarily on forage fish. Steelhead feed on fish, squid, and amphipods. All of these prey species can be found in the marine water habitats offshore of the refinery dock. In addition, Pacific herring and surf smelt spawning habitats occur in the action area (WDFW 2019a). Potential effects on prey species would be the

same as those described for bull trout, Chinook salmon, and steelhead: increases in vessel traffic to the refinery would increase underwater noise, which could cause prey species to avoid the area, and would increase the likelihood of spills associated with vessel traffic, which would increase the potential for exposure to toxins.

6.3.5 Bocaccio and Yelloweye Rockfish

Potential effects on bocaccio and yelloweye rockfish would be similar to the effects described for salmonids: effects from underwater noise generated from vessel traffic and an increased likelihood of spills and potential effects on prey species.

6.3.5.1 Construction Impacts

No in-water construction is proposed.

6.3.5.2 Operational Impacts

Vessel Traffic

Increased vessel traffic may impact bocaccio and yelloweye rockfish in the action area through the associated increase in underwater noise. However, it is expected that the increase in vessel traffic associated with operation of the project would cause only slight, temporary, and periodic alteration of background noise levels.

Likelihood of Spills

Potential effects due to a spill are similar to those described for salmonids. Toxins from oil can directly enter the blood through the gills during respiration, potentially killing the fish. Ingestion of oil can kill fish through direct ingestion or through the ingestion of infected prey species. Adult fish can experience reduced growth, increased liver size, changes in respiratory and circulatory function, and reduced reproductive success after exposure to oil. Oil can also impact reproduction by decreasing the viability of eggs and juvenile fish (Wirwa 2010). However, the likelihood of spills occurring is low. Additionally, BMPs such as double hulls for tankers, automatic controls, and redundancies, as well as procedural elements such as personnel training, rules and procedures, and training would all further decrease risks associated with spills (Michael and Winslow 2000).

Potential Effect to Prey

Larval rockfish feed on zooplankton, copepods, phytoplankton, krill, and other invertebrates. Juveniles are opportunistic feeders, consuming fish larvae, copepods, krill, and euphausiids of all life stages. Adults are primarily piscivores, eating other rockfishes, hake, sablefish, anchovies, lanternfishes, and squid (NMFS 2017). Effects on prey species would be limited to effects from underwater noise generated by vessels calling at the refinery and an increased likelihood of spill events.

6.3.6 North American Green Sturgeon

Potential direct and/or indirect effects to North American green sturgeon are similar to effects described for bocaccio and yelloweye rockfish.

6.3.7 Pacific Eulachon

Potential direct and/or indirect effects to Pacific eulachon are similar to effects described for bocaccio, yelloweye rockfish, and North American green sturgeon.

6.3.8 Humpback Whale

Operational effects include increased potential for strikes with vessels, increased underwater noise, and potential impacts to prey species.

6.3.8.1 Operational Effects

Vessel Strikes

An increase in vessel traffic may increase the risk of whale strikes. Inadvertent vessel strikes can injure or kill humpback whales. Humpback whales are vulnerable to vessel strikes throughout their range, but the risk is much higher in some coastal areas with heavy ship traffic. The low likelihood that a humpback whale would be present in the action areas combined with the slight increase in vessel traffic and implementation of vessel-operating procedures and marine mammal protections outlined in Section 2.5.3 would reduce the risk of whale strikes and considered discountable and insignificant.

Vessel-Based Harassment

Increased vessel traffic may cause stress and behavioral changes in humpback whales. However, increases in vessel traffic associated with the Green Apple Project would occur in established shipping lanes and would not affect humpback whale foraging areas.

Increased Underwater Noise

An increase in marine vessel traffic may increase underwater noise depending on type of vessel and vessel speeds. Increases in underwater noise associated with increases in vessel traffic can result in behavioral changes in foraging humpback whales (Blair et al. 2016). A study in Glacier Bay National Park found that humpbacks utilized several strategies to deal with elevated ambient noise levels (such as increasing the source levels of their calls) (Fournet et al. 2019).

Although the increase in vessel traffic resulting from the Green Apple project would be permanent, the 143 annual vessel movements represent less than one vessel trip (either inbound or outbound) every other day, and each noise event would be short in duration.

It is expected that underwater noise associated with marine vessels will be periodic and short in duration, and that implementation of vessel-operating procedures and marine mammal protections outlined in Section 2.5.3 would further reduce the effect of noise generated by vessels on marine mammal foraging.

Likelihood of Spills

Effects due to a spill would be similar to those described for fish species. Ingestion of oil can kill whales through direct ingestion or through the ingestion of infected prey species. Whales can experience immune system suppression, ulceration, behavioral changes, and reduced reproductive success after exposure to oil (Wirwa 2010). However, the likelihood of spills occurring are low, and BMPs such as double hulls for tankers, automatic controls, and redundancies, in addition to procedural elements such as personnel training, rules and procedures, and training would further decrease the likelihood of spills (Michel and Winslow 2000).

6.3.8.2 Potential Effect to Prey

Humpback whales eat a variety of benthic and pelagic organisms, but primarily herring, which are found throughout Puget Sound and are mapped as occurring just offshore from the refinery (WDFW 2019a). Potential effects on prey species are the same as those described for other marine fish species: effects from underwater noise generated by vessels calling at the refinery and an increased likelihood of spill events.

6.3.9 Southern Resident Killer Whale

Proposed vessel routes for the project would transit through critical habitat for the Southern Resident killer whale. Potential effects on the Southern Resident killer whale from the proposed Green Apple project would include effects related to increased underwater noise due to vessel traffic and an increased likelihood for spill events. Potential indirect effects on the Southern Resident killer whale from this project would include increased potential for strikes with vessels and potential impacts to prey species.

6.3.9.1 Operational Effects

Vessel Strikes

An increase in vessel traffic may increase the risk of whale strikes. Inadvertent vessel strikes can injure or kill killer whales. Whales are vulnerable to vessel strikes throughout their range, but the risk is much higher in some coastal areas with heavy ship traffic. Because vessels associated with the Green Apple project would proceed in a straight path and relatively low speeds toward the refinery dock, because there is a low probability of encountering a Southern Resident killer whale in the action area, and because vessels operators would review extensive whale sighting data collected by the Orca Network to obtain information about Southern Resident killer whale activity in the area, effects to Southern Resident killer whale associated with vessel collision would be discountable.

Increased Underwater Noise

An increase in marine vessel traffic as part of project operations may increase underwater noise in the action area depending on type of vessel and vessel speeds. Increases in vessel traffic and associated underwater noise can result in changes to killer whales' behavior, potentially causing avoidance of the area when vessels are calling at the refinery.

As previously described, Williams et al. (2014) found that in median noise conditions in Haro Strait, killer whales lose 62 percent of their acoustic communication space due to vessel traffic noise, and in peak traffic hours lose up to 97 percent of that space. Holt et al. (2008; 2011) showed that Southern Resident killer whales in the waters surrounding the San Juan Islands increased their call source level as vessel noise increased. However, the action area does not consist of the same high volume traffic as the shipping lanes surrounding the San Juan Islands and does not include core foraging areas for Southern Resident killer whales.

Incremental increases in vessel noise from project operations could increase behavioral changes in foraging and masking effects. Although the increase in vessel traffic resulting from the Green Apple Project would be permanent, the 143 annual vessel movements represent less than one vessel trip (either inbound or outbound) every other day and each noise event would be short in duration.

It is expected that underwater noise associated with marine vessels will be periodic and short in duration, and that implementation of vessel-operating procedures and marine mammal protections outlined in Section 2.5.3 would further reduce the effect of noise generated by vessels on marine mammal foraging.

Increased Likelihood of Spills

Effects due to a spill would be similar to those described for fish species. Ingestion of oil can kill whales through direct ingestion or through the ingestion of infected prey species. Whales can experience immune system suppression, ulceration, behavioral changes, and reduced reproductive success after exposure to oil (Wirwa 2010). However, the likelihood of spills occurring are low, and BMPs such as double hulls for tankers, automatic controls, and redundancies, in addition to procedural elements such as personnel training, rules and procedures, and training would further decrease the likelihood of spills (Michel and Winslow 2000).

6.3.9.2 Potential Effect to Prey

Potential impacts to prey species would be similar to those listed for Chinook salmon: effects from underwater noise generated by vessels calling at the refinery and an increased likelihood of spill events.

7. Effects Determination

The recommended determinations for ESA-listed species and critical habitats are summarized in Table 4.

Table 4. Effects Determination for ESA-Listed Species and Critical Habitats

Species	ESA Status	Effects Determination for Species	Effects Determination for Critical Habitat
Species Under USFWS Jurisdiction			
Bull Trout <i>Salvelinus confluentus</i>	Threatened	May affect, not likely to adversely affect	Designated in Action Area No Effect
Dolly Varden <i>Salvelinus malma</i>	Proposed (Similarity of Appearance)	Not evaluated	Not applicable, critical habitat is not designated for this species
Oregon Spotted Frog <i>Rana pretiosa</i>	Threatened	No Effect	No effect, not designated in Action Area
Marbled Murrelet <i>Brachyramphus marmoratus</i>	Threatened	May affect, not likely to adversely affect	No effect, not designated in Action Area
Species Under NMFS Jurisdiction			
Chinook Salmon <i>Oncorhynchus tshawytscha</i> Puget Sound ESU	Threatened	May affect, not likely to adversely affect	Designated in Action Area, No Effect
Steelhead <i>Oncorhynchus mykiss</i> Puget Sound DPS	Threatened	May affect, not likely to adversely affect	No effect, not designated in Action Area
Bocaccio <i>Sebastes paucispinis</i> Puget Sound/Georgia Basin DPS	Endangered	May affect, not likely to adversely affect	Designated in Action Area, No Effect
Yelloweye Rockfish <i>Sebastes ruberrimus</i> Puget Sound/Georgia Basin DPS	Threatened	May affect, not likely to adversely affect	Designated in Action Area, No Effect
North American Green Sturgeon <i>Acipenser medirostris</i> Southern DPS	Threatened	May affect, not likely to adversely affect	No effect, not designated in Action Area
Pacific Eulachon (Columbia River Smelt) <i>Thaleichthys pacificus</i> Southern DPS	Threatened	May affect, not likely to adversely affect	No effect, not designated in Action Area
Humpback Whale <i>Megaptera novaeangliae</i>		May affect, not likely to adversely affect	Not applicable, critical habitat is not designated for this species

Mexico DPS	Threatened		
Central America DPS	Endangered		
Killer Whale <i>Orcinus orca</i>	Endangered	May affect, not likely to adversely affect	Designated in Action Area,
Southern Resident DPS			No Effect

Key: ESA = Endangered Species Act; ESU = Evolutionarily Significant Unit; DPS = Distinct Population Segment; NMFS = National Marine Fisheries Service; USFWS = U.S. Fish and Wildlife Service

7.1 Species under USFWS Jurisdiction

7.1.1 Bull Trout

7.1.1.1 Species Effects

Potential direct and indirect effects to bull trout resulting from the project include those associated with increased shipping traffic and effects to prey resources.

A **may affect** determination is warranted for bull trout because:

Bull trout may be present in the nearshore areas near the dock when vessels are approaching and/or leaving the facilities.

But the project is **not likely to adversely affect** bull trout because:

Noise generated by vessels would likely be an incremental increase over background noise levels, and each noise event would be short in duration.

The likelihood of a spill would be low, and aggressive BMPs and response activities would be in place to mitigate effects from spill events.

Vessel calling at the dock may displace prey species for bull trout but would be localized and not expected to have long-term impacts of food resources.

Therefore, effects are considered insignificant and discountable.

7.1.1.2 Critical Habitat

The following PCEs for bull trout are present in the action area:

- PCE #2: Migratory habitat with minimal physical, biological, or water quality impediments.
- PCE #3: Abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.
- PCE #5: Water temperatures ranging between 2° to 15°C (39° to 59°F) with adequate thermal refugia available for temperatures at the upper end of the range.
- PCE #8: Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.

A **no effect** determination is warranted for bull trout critical habitat because:

Noise generated by vessels would likely be an incremental increase over background noise levels, and each noise event would be short in duration. The likelihood of a spill would be low, and aggressive BMPs and response activities would be in place to mitigate effects from spill events.

7.1.2 Oregon Spotted Frog

Potential direct and indirect effects to the Oregon spotted frog resulting from the project include a potential permanent loss of wetland habitats.

A **no effect** determination is warranted for the Oregon spotted frog because:

Oregon spotted frogs are not found in the project area, and the wetland habitats present in the project area are degraded and are not considered suitable habitat for Oregon spotted frog.

Mitigation for the wetlands lost during construction would result in the creation or enhancement of wetland habitats within the same drainage. These mitigation sites will likely provide more suitable habitat for amphibians than those currently present in the action area.

7.1.3 Marbled Murrelet

Potential direct and indirect effects to marbled murrelets resulting from the project include periodic disturbance from in-air noise and effects associated with increased vessel traffic. Marbled murrelets may forage in the action area.

A **may affect** determination is warranted for the marbled murrelet because:

The marbled murrelet may be forage in the offshore marine portion of the action area when vessels are approaching/leaving the refinery.

But the project is **not likely to adversely affect** marbled murrelet because:

Terrestrial habitats in the action area are not considered suitable for murrelets, and marine habitats would not be directly impacted by the project. The increase in noise generated by vessels would be small, and each noise event would be short in duration. The likelihood of a spill would be low, and aggressive BMPs and response activities would be in place to mitigate effects from spill events. Consequently, potential effects are considered insignificant and discountable.

7.2 Species under NMFS Jurisdiction

7.2.1 Chinook Salmon and Steelhead

7.2.1.1 Species Effects

Potential direct and indirect effects to Puget Sound Chinook salmon and steelhead resulting from the project include those associated with increased shipping traffic and effects to prey resources.

A **may affect** determination is warranted for Puget Sound Chinook salmon and steelhead because:

Puget Sound Chinook salmon and steelhead may be present near the dock when vessels are approaching and/or leaving the facilities.

But the project is **not likely to adversely affect** Puget Sound Chinook salmon and steelhead because:

Noise generated by vessels would likely be an incremental increase over background noise levels, and each noise event would be short in duration. The likelihood of a spill would be low, and aggressive BMPs and response activities would be in place to mitigate effects from spill events.

Therefore, these effects are considered insignificant and discountable.

7.2.1.2 Critical Habitat

Critical habitat for steelhead is not designated in the action area. The following PCEs for Chinook salmon critical habitat are present in the action area:

- PCE #5: Nearshore marine areas free of obstruction with water quality and quantity conditions and forage including aquatic invertebrates and fishes supporting growth and maturation; and natural cover, such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders and side channels.
- PCE# 6: Offshore areas with water quality conditions and forage including aquatic invertebrates and fishes, supporting growth and maturation.

A **no effect** determination is warranted for Puget Sound ESU Chinook salmon critical habitat because:

There is no-water work or direct modification of habitat. Noise generated by vessels would likely be an incremental increase over background noise levels, and each noise event would be short in duration. The likelihood of a spill would be low, and aggressive BMPs and response activities would be in place to mitigate effects from spill events. Consequently, these effects are considered insignificant and discountable.

7.2.2 Bocaccio and Yelloweye Rockfish

7.2.2.1 Species Effects

The deep-water dock may provide habitat for adult rockfish, which prefer deeper waters with rocky substrate. Any rockfish in the vicinity of the shore are likely pelagic larvae or possibly juveniles.

A **may affect** determination is warranted for Georgia Basin DPS bocaccio and yelloweye rockfish because:

Listed rockfish may be present in the action area when vessels are approaching/leaving the refinery.

The project is within designated critical habitat.

But the project **is not likely to adversely affect** Georgia Basin DPS bocaccio and yelloweye rockfish because:

Noise generated by vessels would likely be an incremental increase over background noise levels, and each noise event would be short in duration. The likelihood of a spill would be low, and aggressive BMPs and response activities would be in place to mitigate effects from spill events. Consequently, these effects are considered insignificant and discountable.

The project is not expected to affect the distribution or abundance of rockfish or their potential prey species in the action area.

7.2.2.2 Critical Habitat

Critical habitat for rockfish includes several attributes that determine the quality of the habitat and are useful in considering the conservation value that may require special management considerations or protection. These attributes include:

1. Quantity, quality, and availability of prey species to support individual growth, survival, reproduction, and feeding opportunities;
2. Water quality and sufficient levels of dissolved oxygen to support growth, survival, reproduction, and feeding opportunities; and
3. The type and amount of structure and rugosity that supports feeding opportunities and predatory avoidance.

A **no effect** determination is warranted for bocaccio and yelloweye rockfish critical habitat because:

There is no-water work or direct modification of habitat. Noise generated by vessels would likely be an incremental increase over background noise levels, and each noise event would be short in duration. The

likelihood of a spill is low, and aggressive BMPs and response activities would be in place to mitigate effects from spill events. Therefore, the quality of habitat would remain the same.

7.2.3 North American Green Sturgeon

As with other fish species, indirect effects to Southern DPS North American green sturgeon from this project could occur from increased vessel traffic to the refinery.

A **may affect** determination is warranted for green sturgeon because:

Green sturgeon may be present in the action area when vessels are approaching/leaving the refinery.

But the project is **not likely to adversely affect** Southern DPS North American green sturgeon because:

It is unlikely that green sturgeon will be present in the action area, given that their presence in Puget Sound/Georgia Basin is rare and therefore discountable.

Noise generated by vessels would likely be an incremental increase over background noise levels, and each noise event would be short in duration. The likelihood of a spill would be low, and aggressive BMPs and response activities would be in place to mitigate effects from spill events. Consequently, these effects are considered insignificant and discountable.

7.2.4 Pacific Eulachon

As with other fish species, indirect effects to eulachon from this project could occur from increased vessel traffic to the refinery. Critical habitat is not present in the action area.

A **may affect** determination is warranted for Southern DPS eulachon because:

Eulachon may be present in the action area when vessels are approaching/leaving the refinery.

But the project is **not likely to adversely affect** Southern DPS eulachon because:

It is unlikely that Southern DPS eulachon are be present in the action area, given that their presence in Puget Sound/Georgia Basin is rare and therefore discountable.

Noise generated by vessels would likely be an incremental increase over background noise levels, and each noise event would be short in duration. The likelihood of a spill would be low, and aggressive BMPs and response activities would be in place to mitigate effects from spill events. Consequently, these effects are considered insignificant and discountable.

7.2.5 Humpback Whale

A **may affect** determination is warranted for the humpback whale because:

Humpback whales may be present in the action area when vessels are approaching/leaving the refinery.

But the project is **not likely to adversely affect** the humpback whale because:

Humpback whales are unlikely to be found in the action area, and critical habitat is not designated the species. Implementation of vessel-operating procedures and marine mammal protections outlined in Section 2.5.3 would reduce the effect of noise generated by vessels on marine mammal foraging. Effects associated with increased underwater noise from vessel traffic will be short in duration, periodic, and small. The likelihood of a spill would be low, and aggressive BMPs and response activities would be in place to mitigate effects from spill events. Consequently, these effects are considered insignificant and discountable.

7.2.6 Southern Resident Killer Whale

7.2.6.1 Species Effects

A **may affect** determination is warranted for Southern Resident killer whale because:

Southern Resident killer whales have been documented in the action area and may be present when vessels are approaching/leaving the refinery.

But the project **is not likely to adversely affect** the Southern Resident killer whale because:

Effects associated with increased underwater noise from vessel traffic will be short in duration, periodic, and small. Implementation of vessel-operating procedures and marine mammal protections outlined in Section 2.5.3 would reduce the effect of noise generated by vessels on marine mammal foraging.

The action area does not include core foraging habitats and species occurrence is considered rare.

The likelihood of a spill would be low, and aggressive BMPs and response activities would be in place to mitigate effects from spill events. Consequently, these effects are considered insignificant and discountable.

7.2.6.2 Critical Habitat

PCEs for killer whale include the following:

- PCE #1: Water quality to support growth and development.
- PCE #2: Prey species of sufficient quantity, quality and availability to support individual growth, reproduction, and development, as well as overall population growth.
- PCE #3: Passage conditions to allow for migration, resting, and foraging.

A **no effect** determination is warranted for the Southern Resident killer whale critical habitat because:

There is no-water work or direct modification of habitat. Noise generated by vessels would likely be an incremental increase over background noise levels, and each noise event would be short in duration. The likelihood of a spill would be low, and aggressive BMPs and response activities would be in place to mitigate effects from spill events. Consequently, these effects are considered insignificant and discountable.

8. Essential Fish Habitat Assessment

This document was prepared as a resource document for concurrent EFH consultation with NMFS for compliance with the Magnuson-Stevens Act and the 1996 Sustainable Fisheries Act. The objective of this EFH assessment is to determine whether the proposed project may adversely affect designated EFH for relevant commercial, federally managed fish species within the proposed action area. It also describes conservation measures proposed to avoid, minimize, or otherwise offset potential adverse effects to designated EFH resulting from the proposed project. Subsection 50 CFR 600.920(f) specifies that EFH consultation should be consolidated with existing environmental review procedures required by other statutes, such as ESA, when appropriate.

8.1 Essential Fish Habitat Background

The Magnuson-Stevens Act, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-297), requires federal agencies to consult with NMFS on any action authorized, funded, or undertaken that may adversely affect any EFH identified under the Magnuson-Stevens Act.

EFH has been defined for the purposes of the Magnuson-Stevens Act as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity” (NOAA 1999). NMFS has further added the following interpretations to clarify this definition:

- “Waters” include aquatic areas and their associated physical, chemical, and biological properties that are used by fish, and may include areas historically used by fish where appropriate.
- “Substrate” includes sediment, hard bottom, structures underlying the waters, and associated biological communities.
- “Necessary” means the habitat required to support a sustainable fishery and the managed species’ contribution to a healthy ecosystem.
- “Spawning, breeding, feeding, or growth to maturity” covers the full life cycle of a species.

8.2 EFH in the Project Area

The Pacific Fishery Management Council (PFMC) is responsible for designating EFH for all federally managed species occurring in the coastal and marine waters off the coasts of Washington, Oregon, and California, including the Strait of Georgia. The PFMC designated EFH for these species within the Fishery Management Plans (FMPs) for each of the four primary fisheries that they manage: Pacific Coast Salmon, Coastal Pelagic Species, Pacific Coast Groundfish, and Pacific Highly Migratory Species. Of these four fisheries, three (Pacific Coast Salmon, Coastal Pelagic Species, and Pacific Coast Groundfish) contain species for which EFH has been designated in water within the project area and the Strait of Georgia.

EFH guidelines published in federal regulations identify “habitat areas of particular concern” (HAPC) as types or areas of habitat within EFH that are identified based on one or more of the following considerations:

- The importance of the ecological function provided by the habitat.
- The extent to which the habitat is sensitive to human-induced environmental degradation.
- Whether, and to what extent, development activities are or will be stressing the habitat type.
- The rarity of the habitat type (50 CFR 600.815(a)(8)).

Out of the four fisheries managed by the PFMC, HAPC has only been identified for groundfish. The four HAPCs designated for these species include seagrass, canopy kelp, rocky reef, and estuarine habitats along the Pacific coast. Of these habitat types, no HAPCs are identified within the project area using the NMFS EFH mapper (NMFS 2019b).

8.2.1 Pacific Coast Salmon EFH

The Pacific Coast Salmon management unit includes Chinook, coho, and pink salmon (PFMC 2016a). The proposed project occurs within an area that provides habitat for these three species of salmon. EFH for the Pacific Coast Salmon fishery includes those waters and substrate necessary for salmon production needed to support a long-term sustainable salmon fishery and salmon contributions to a healthy ecosystem. EFH includes viable waterbodies and most of the habitat historically accessible to salmon in the Strait of Georgia.

8.2.2 Coastal Pelagic Species EFH

The Coastal Pelagic Species management unit includes jack mackerel (*Trachurus symmetricus*), Pacific (chub) mackerel (*Scomber japonicus*), Pacific sardine, northern anchovy (*Engraulis mordax*), and market squid (*Loligo opalescens*) (PFMC 1998). In October 2006, the Coastal Pelagic Species FMP was amended to include all krill species. In July 2009, Amendment 12 to the Coastal Pelagic Species FMP prohibited the harvest of krill within California, Oregon, and Washington waters (74 FR 33372). No krill harvest would occur in conjunction with the proposed project.

8.2.3 Pacific Coast Groundfish EFH

The Pacific Coast Groundfish management unit includes over 90 groundfish species (PFMC 2016b). Site-specific surveys of groundfish species have not been conducted for the project; however, it is likely that groundfish species such as lingcod (*Ophiodon elongatus*), starry flounder (*Platichthys stellatus*), sand sole (*Psettichthys melanostictus*), rock sole (*Lepidopsetta* spp.), English sole (*Parophrys vetulus*), spiny dogfish (*Squalus suckleyi*), ratfish (*Hydrolagus* spp.), copper rockfish (*Sebastes caurinus*) and various other rockfish species (*Sebastes* spp.) exist within the water surrounding the project in the Strait of Georgia.

8.3 EFH Determination

Based on this information and the above definition, the proposed project **will not adversely affect** EFH for Pacific Coast Salmon, Coastal Pelagic Species, or Pacific Coast Groundfish.

This conclusion is appropriate because operation of the project and increased vessel occurrences are not expected to impact long-term food resources for EFH composite species. In addition, the risk that a spill would occur as a result of this proposed project is relatively low, and numerous plans have been established to coordinate spill cleanup and control efforts. Control of spills from vessel operation is largely controlled by the USCG.

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Appendix

Appendix A. Species Lists

USFWS IPAC ESA List (Unofficial)

NMFS ESA-Listed West Coast Salmon and Steelhead

NMFS Other ESA-Listed Species

NMFS ESA-Listed Marine Mammals

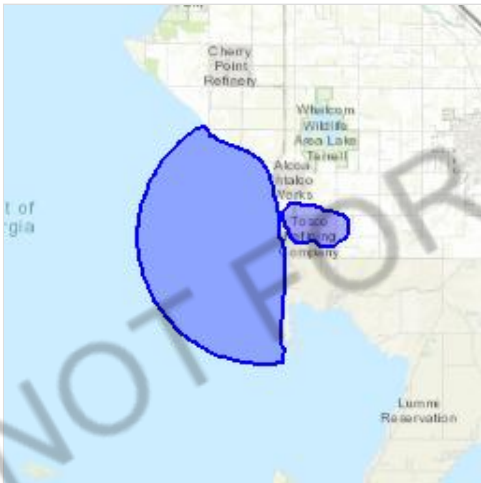
IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Whatcom County, Washington



Local office

Washington Fish And Wildlife Office

☎ (360) 753-9440

📠 (360) 753-9405

510 Desmond Drive Se, Suite 102
Lacey, WA 98503-1263

<http://www.fws.gov/wafwo/>

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species¹ and their critical habitats are managed by the [Ecological Services Program](#) of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries²).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact [NOAA Fisheries](#) for [species under their jurisdiction](#).

1. Species listed under the [Endangered Species Act](#) are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the [listing status page](#) for more information.
2. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME

STATUS

Gray Wolf *Canis lupus*
No critical habitat has been designated for this species.

Proposed Endangered

North American Wolverine *Gulo gulo luscus*
No critical habitat has been designated for this species.
<https://ecos.fws.gov/ecp/species/5123>

Proposed Threatened

Birds

NAME	STATUS
Marbled Murrelet <i>Brachyramphus marmoratus</i> There is final critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/4467	Threatened
Streaked Horned Lark <i>Eremophila alpestris strigata</i> There is final critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/7268	Threatened
Yellow-billed Cuckoo <i>Coccyzus americanus</i> There is proposed critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/3911	Threatened

Fishes

NAME	STATUS
Bull Trout <i>Salvelinus confluentus</i> There is final critical habitat for this species. Your location overlaps the critical habitat. https://ecos.fws.gov/ecp/species/8212	Threatened
Dolly Varden <i>Salvelinus malma</i> No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/1008	PSAT

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

This location overlaps the critical habitat for the following species:

NAME	TYPE
------	------

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act¹ and the Bald and Golden Eagle Protection Act².

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described [below](#).

1. The [Migratory Birds Treaty Act](#) of 1918.
2. The [Bald and Golden Eagle Protection Act](#) of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern <http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php>
- Measures for avoiding and minimizing impacts to birds <http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php>
- Nationwide conservation measures for birds <http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf>

The birds listed below are birds of particular concern either because they occur on the [USFWS Birds of Conservation Concern](#) (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ [below](#). This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the [E-bird data mapping tool](#) (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found [below](#).

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME

BREEDING SEASON (IF A
BREEDING SEASON IS INDICATED
FOR A BIRD ON YOUR LIST, THE
BIRD MAY BREED IN YOUR
PROJECT AREA SOMETIME WITHIN

THE TIMEFRAME SPECIFIED,
WHICH IS A VERY LIBERAL
ESTIMATE OF THE DATES INSIDE
WHICH THE BIRD BREEDS
ACROSS ITS ENTIRE RANGE.
"BREEDS ELSEWHERE" INDICATES
THAT THE BIRD DOES NOT LIKELY
BREED IN YOUR PROJECT AREA.)

Bald Eagle *Haliaeetus leucocephalus*

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

<https://ecos.fws.gov/ecp/species/1626>

Breeds Jan 1 to Sep 30

Black Oystercatcher *Haematopus bachmani*

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

<https://ecos.fws.gov/ecp/species/9591>

Breeds Apr 15 to Oct 31

Black Scoter *Melanitta nigra*

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Breeds elsewhere

Black Turnstone *Arenaria melanocephala*

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Breeds elsewhere

Bonaparte's Gull *Chroicocephalus philadelphia*

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Breeds elsewhere

Common Loon *Gavia immer*

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

<https://ecos.fws.gov/ecp/species/4464>

Breeds Apr 15 to Oct 31

Common Murre *Uria aalge*

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Breeds Apr 15 to Aug 15

Common Tern *Sterna hirundo*

Breeds May 10 to Sep 10

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

<https://ecos.fws.gov/ecp/species/4963>

Double-crested Cormorant *phalacrocorax auritus*

Breeds Apr 20 to Aug 31

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

<https://ecos.fws.gov/ecp/species/3478>

Great Blue Heron *Ardea herodias fannini*

Breeds Mar 15 to Aug 15

This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

Herring Gull *Larus argentatus*

Breeds Apr 20 to Aug 31

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Lesser Yellowlegs *Tringa flavipes*

Breeds elsewhere

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

<https://ecos.fws.gov/ecp/species/9679>

Long-tailed Duck *Clangula hyemalis*

Breeds elsewhere

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

<https://ecos.fws.gov/ecp/species/7238>

Marbled Godwit *Limosa fedoa*

Breeds elsewhere

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

<https://ecos.fws.gov/ecp/species/9481>

Olive-sided Flycatcher *Contopus cooperi*

Breeds May 20 to Aug 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

<https://ecos.fws.gov/ecp/species/3914>

Parasitic Jaeger <i>Stercorarius parasiticus</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds elsewhere
Red-breasted Merganser <i>Mergus serrator</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds elsewhere
Red-necked Phalarope <i>Phalaropus lobatus</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds elsewhere
Red-throated Loon <i>Gavia stellata</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
Ring-billed Gull <i>Larus delawarensis</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds elsewhere
Rufous Hummingbird <i>elasphorus rufus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8002	Breeds Apr 15 to Jul 15
Semipalmated Sandpiper <i>Calidris pusilla</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
Short-billed Dowitcher <i>Limnodromus griseus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9480	Breeds elsewhere
Surf Scoter <i>Melanitta perspicillata</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds elsewhere

Whimbrel *Numenius phaeopus*

Breeds elsewhere

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

<https://ecos.fws.gov/ecp/species/9483>

White-winged Scoter *Melanitta fusca*

Breeds elsewhere

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is $0.25/0.25 = 1$; at week 20 it is $0.05/0.25 = 0.2$.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (■)

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (I)

Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

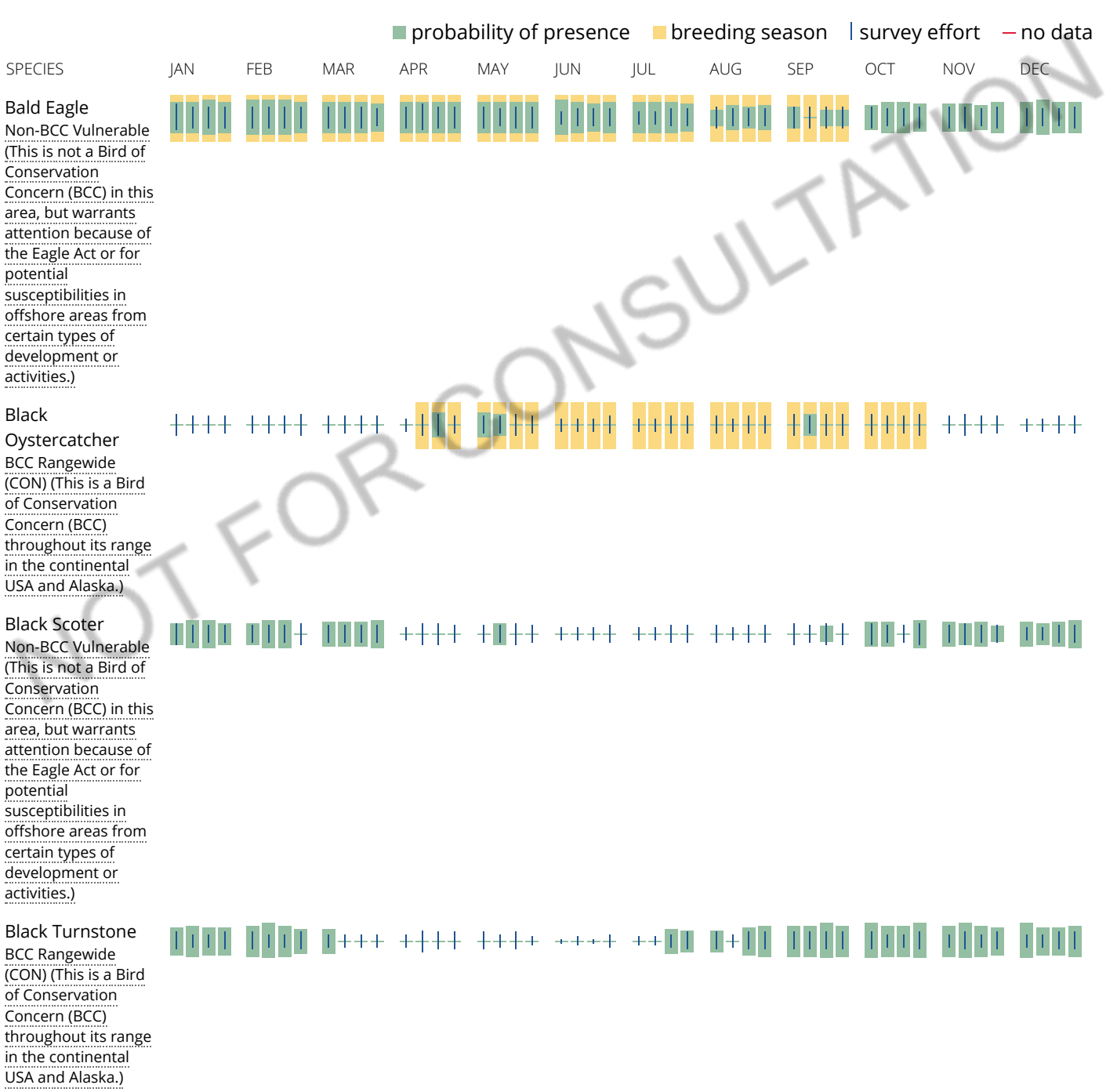
To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)

A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



Bonaparte's Gull
Non-BCC Vulnerable
(This is not a Bird of
Conservation
Concern (BCC) in this
area, but warrants
attention because of
the Eagle Act or for
potential
susceptibilities in
offshore areas from
certain types of
development or
activities.)



Common Loon
Non-BCC Vulnerable
(This is not a Bird of
Conservation
Concern (BCC) in this
area, but warrants
attention because of
the Eagle Act or for
potential
susceptibilities in
offshore areas from
certain types of
development or
activities.)



Common Murre
Non-BCC Vulnerable
(This is not a Bird of
Conservation
Concern (BCC) in this
area, but warrants
attention because of
the Eagle Act or for
potential
susceptibilities in
offshore areas from
certain types of
development or
activities.)



Common Tern
Non-BCC Vulnerable
(This is not a Bird of
Conservation
Concern (BCC) in this
area, but warrants
attention because of
the Eagle Act or for
potential
susceptibilities in
offshore areas from
certain types of
development or
activities.)



SPECIES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Double-crested Cormorant Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)												
Great Blue Heron BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)												
Herring Gull Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)	++++	++	++++	++	++++	++++	++++	++++	++++	++++	++++	++++
Lesser Yellowlegs BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)	++++	++++	++++	++	++	++++	++++	++	++++	++++	++++	++++
Long-tailed Duck Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)					++	++++	++++	++++	++++	++		
Marbled Godwit BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)	++++	++++	++++	++	++++	++++	++++	++++	++++	++	++++	++++

Olive-sided
Flycatcher

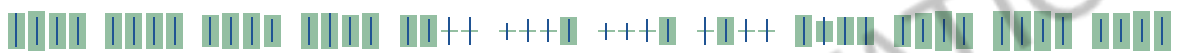
BCC Rangewide
(CON) (This is a Bird
of Conservation
Concern (BCC)
throughout its range
in the continental
USA and Alaska.)



Parasitic Jaeger
Non-BCC Vulnerable
(This is not a Bird of
Conservation
Concern (BCC) in this
area, but warrants
attention because of
the Eagle Act or for
potential
susceptibilities in
offshore areas from
certain types of
development or
activities.)



Red-breasted
Merganser
Non-BCC Vulnerable
(This is not a Bird of
Conservation
Concern (BCC) in this
area, but warrants
attention because of
the Eagle Act or for
potential
susceptibilities in
offshore areas from
certain types of
development or
activities.)

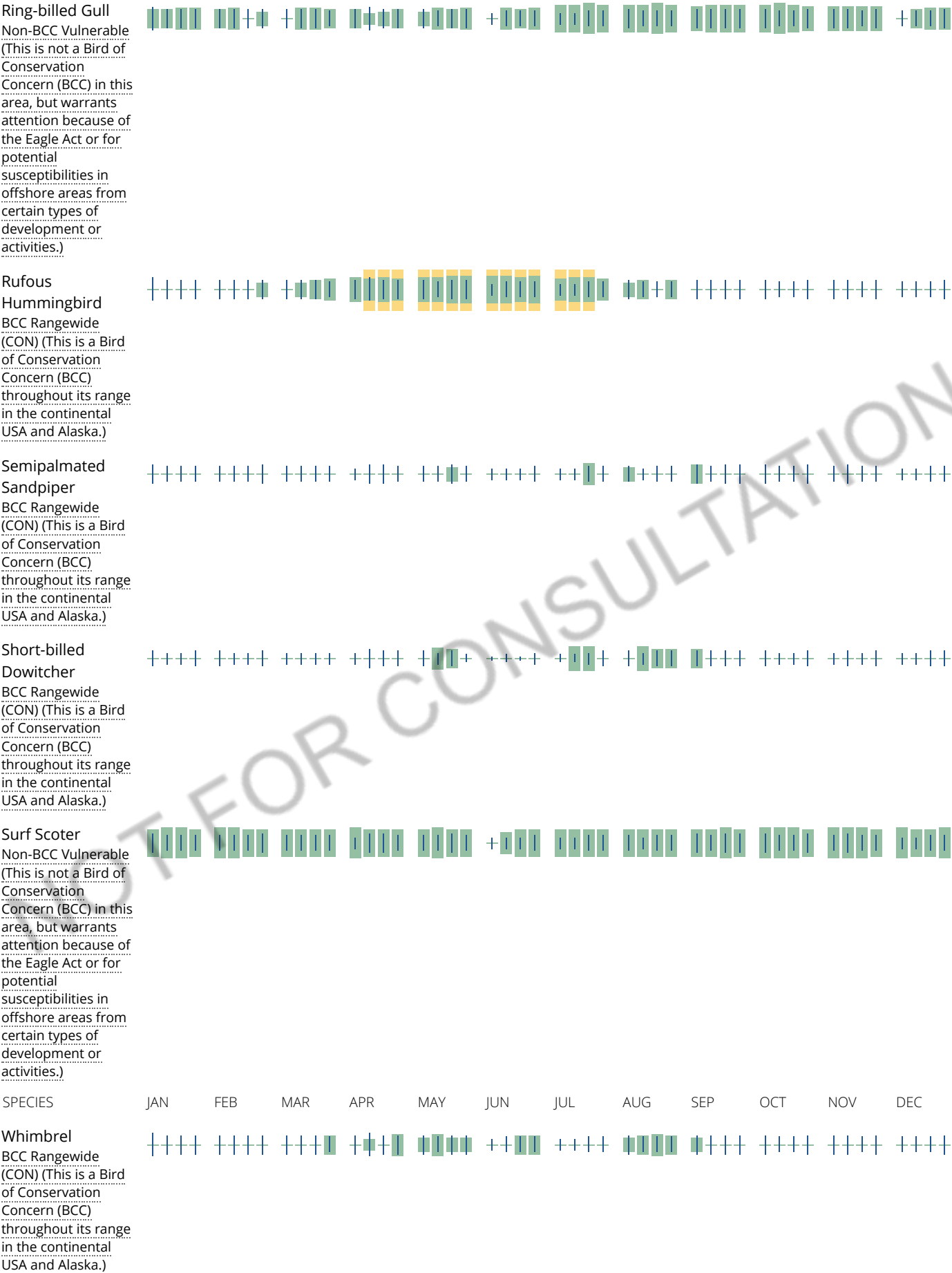


Red-necked
Phalarope
Non-BCC Vulnerable
(This is not a Bird of
Conservation
Concern (BCC) in this
area, but warrants
attention because of
the Eagle Act or for
potential
susceptibilities in
offshore areas from
certain types of
development or
activities.)



Red-throated Loon
BCC Rangewide
(CON) (This is a Bird
of Conservation
Concern (BCC)
throughout its range
in the continental
USA and Alaska.)





White-winged

Scoter

Non-BCC Vulnerable

(This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)



Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

[Nationwide Conservation Measures](#) describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. [Additional measures](#) and/or [permits](#) may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS [Birds of Conservation Concern \(BCC\)](#) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the [Avian Knowledge Network \(AKN\)](#). The AKN data is based on a growing collection of [survey, banding, and citizen science datasets](#) and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle ([Eagle Act](#) requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the [AKN Phenology Tool](#).

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the [Avian Knowledge Network \(AKN\)](#). This data is derived from a growing collection of [survey, banding, and citizen science datasets](#).

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: [The Cornell Lab of Ornithology All About Birds Bird Guide](#), or (if you are unsuccessful in locating the bird of interest there), the [Cornell Lab of Ornithology Neotropical Birds](#)

[guide](#). If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are [Birds of Conservation Concern](#) (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the [Eagle Act](#) requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the [Northeast Ocean Data Portal](#). The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the [NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf](#) project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the [Diving Bird Study](#) and the [nanotag studies](#) or contact [Caleb Spiegel](#) or [Pam Loring](#).

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to [obtain a permit](#) to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or

minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the [National Wildlife Refuge](#) system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to [NWI wetlands](#) and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local [U.S. Army Corps of Engineers District](#).

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

ESTUARINE AND MARINE DEEPWATER

[M1UBL](#)

[E1UBLx](#)

ESTUARINE AND MARINE WETLAND

[M2AB/USN](#)

[M2USN](#)

FRESHWATER EMERGENT WETLAND

[PEM1C](#)

[PEM1A](#)

[PEM1/SSC](#)

[PEM1Kx](#)

FRESHWATER FORESTED/SHRUB WETLAND

[PFOC](#)

[PSSC](#)

[PSSA](#)

FRESHWATER POND

[PUBKx](#)

[PUBHx](#)

RIVERINE

[R4SBC](#)

A full description for each wetland code can be found at the [National Wetlands Inventory website](#)

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

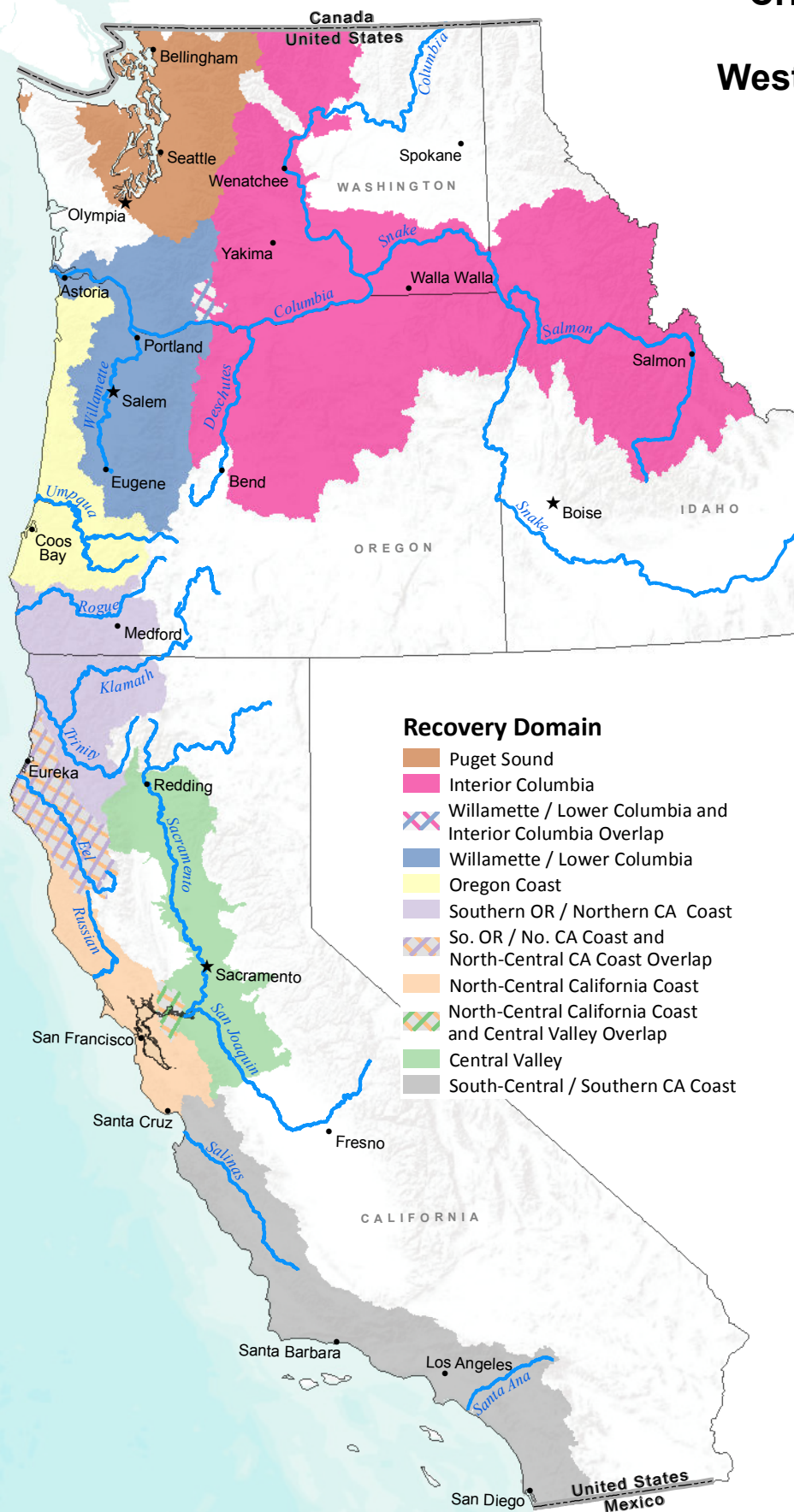
Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tubercid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

Status of ESA Listings & Critical Habitat Designations for West Coast Salmon & Steelhead



Recovery Domain

- Puget Sound
- Interior Columbia
- Willamette / Lower Columbia and Interior Columbia Overlap
- Willamette / Lower Columbia
- Oregon Coast
- Southern OR / Northern CA Coast
- So. OR / No. CA Coast and North-Central CA Coast Overlap
- North-Central California Coast
- North-Central California Coast and Central Valley Overlap
- Central Valley
- South-Central / Southern CA Coast

Evolutionarily Significant Unit / Distinct Population Segment	ESA Status	Date of ESA Listing	Date of CH Designation
Puget Sound Recovery Domain			
Hood Canal Summer-run Chum Salmon	T	3/25/1999	9/2/2005
Ozette Lake Sockeye Salmon	T	3/25/1999	9/2/2005
Puget Sound Chinook Salmon	T	3/24/1999	9/2/2005
Puget Sound Steelhead	T	5/11/2007	2/24/2016

Interior Columbia Recovery Domain			
Middle Columbia River Steelhead	T	3/25/1999 1/5/2006	9/2/2005
Snake River Fall-run Chinook Salmon	T	4/22/1992	12/28/1993
Snake River Spring / Summer-run Chinook Salmon	T	4/22/1992	10/25/1999
Snake River Sockeye Salmon	E	11/20/1991	12/28/1993
Snake River Steelhead	T	8/18/1997 1/5/2006	9/2/2005
Upper Columbia River Spring-run Chinook Salmon	E	3/24/1999	9/2/2005
Upper Columbia River Steelhead	T	8/18/1997 1/5/2006	9/2/2005

Willamette / Lower Columbia Recovery Domain			
Columbia River Chum Salmon	T	3/25/1999	9/2/2005
Lower Columbia River Chinook Salmon	T	3/24/1999	9/2/2005
Lower Columbia River Coho Salmon	T	6/28/2005	2/24/2016
Lower Columbia River Steelhead	T	3/19/1998 1/5/2006	9/2/2005
Upper Willamette River Chinook Salmon	T	3/24/1999	9/2/2005
Upper Willamette River Steelhead	T	3/25/1999 1/5/2006	9/2/2005

Oregon Coast Recovery Domain			
Oregon Coast Coho Salmon	T	2/11/2008	2/11/2008

Southern Oregon / Northern California Coast Recovery Domain			
Southern OR / Northern CA Coasts Coho Salmon	T	5/6/1997	5/5/1999

North-Central California Coast Recovery Domain			
California Coastal Chinook Salmon	T	9/16/1999	9/2/2005
Central California Coast Coho Salmon	E	10/31/1996 (T) 6/28/2005 (E) 4/2/2012 (RE)	5/5/1999
Central California Coast Steelhead	T	8/18/1997 1/5/2006	9/2/2005
Northern California Steelhead	T	6/7/2000 1/5/2006	9/2/2005

Central Valley Recovery Domain			
California Central Valley Steelhead	T	3/19/1998 1/5/2006	9/2/2005
Central Valley Spring-run Chinook Salmon	T	9/16/1999	9/2/2005
Sacramento River Winter-run Chinook Salmon	E	11/5/1990 (T) 1/4/1994 (E)	6/16/1993

South-Central / Southern California Coast Recovery Domain			
South-Central California Coast Steelhead	T	8/18/1997 1/5/2006	9/2/2005
Southern California Steelhead	E	8/18/1997 5/1/2002 (RE) 1/5/2006	9/2/2005

ESA = Endangered Species Act, CH = Critical Habitat, RE = Range Extension
E = Endangered, T = Threatened

Updated July 2016

Critical Habitat Rules Cited

- 2/24/2016 (81 FR 9252) Final Critical Habitat Designation for Puget Sound Steelhead and Lower Columbia River Coho Salmon
- 2/11/2008 (73 FR 7816) Final Critical Habitat Designation for Oregon Coast Coho Salmon
- 9/2/2005 (70 FR 52630) Final Critical Habitat Designation for 12 ESU's of Salmon and Steelhead in WA, OR, and ID
- 9/2/2005 (70 FR 52488) Final Critical Habitat Designation for 7 ESU's of Salmon and Steelhead in CA
- 10/25/1999 (64 FR 57399) Revised Critical Habitat Designation for Snake River Spring/Summer-run Chinook Salmon
- 5/5/1999 (64 FR 24049) Final Critical Habitat Designation for Central CA Coast and Southern OR/Northern CA Coast Coho Salmon
- 12/28/1993 (58 FR 68543) Final Critical Habitat Designation for Snake River Chinook and Sockeye Salmon
- 6/16/1993 (58 FR 33212) Final Critical Habitat Designation for Sacramento River Winter-run Chinook Salmon

ESA Listing Rules Cited

- 4/2/2012 (77 FR 19552) Final Range Extension for Endangered Central California Coast Coho Salmon
- 2/11/2008 (73 FR 7816) Final ESA Listing for Oregon Coast Coho Salmon
- 5/11/2007 (72 FR 26722) Final ESA Listing for Puget Sound Steelhead
- 1/5/2006 (71 FR 5248) Final Listing Determinations for 10 Distinct Population Segments of West Coast Steelhead
- 6/28/2005 (70 FR 37160) Final ESA Listing for 16 ESU's of West Coast Salmon
- 5/1/2002 (67 FR 21586) Range Extension for Endangered Steelhead in Southern California
- 6/7/2000 (65 FR 36074) Final ESA Listing for Northern California Steelhead
- 9/16/1999 (64 FR 50394) Final ESA Listing for Two Chinook Salmon ESUs in California
- 3/25/1999 (64 FR 14508) Final ESA Listing for Hood River Canal Summer-run and Columbia River Chum Salmon
- 3/25/1999 (64 FR 14517) Final ESA Listing for Middle Columbia River and Upper Willamette River Steelhead
- 3/25/1999 (64 FR 14528) Final ESA Listing for Ozette Lake Sockeye Salmon
- 3/24/1999 (64 FR 14308) Final ESA Listing for 4 ESU's of Chinook Salmon
- 3/19/1998 (63 FR 13347) Final ESA Listing for Lower Columbia River and Central Valley Steelhead
- 8/18/1997 (62 FR 43937) Final ESA Listing for 5 ESU's of Steelhead
- 5/6/1997 (62 FR 24588) Final ESA Listing for Southern Oregon / Northern California Coast Coho Salmon
- 10/31/1996 (61 FR 56138) Final ESA Listing for Central California Coast Coho Salmon
- 1/4/1994 (59 FR 222) Final ESA Listing for Sacramento River Winter-run Chinook Salmon
- 4/22/1992 (57 FR 14653) Final ESA Listing for Snake River Spring/summer-run and Snake River Fall Chinook Salmon
- 11/20/1991 (56 FR 58619) Final ESA Listing for Snake River Sockeye Salmon
- 11/5/1990 (55 FR 46515) Final ESA Listing for Sacramento River Winter-run Chinook Salmon



West Coast Region Home
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Other ESA-Listed Species

Under the jurisdiction of NOAA Fisheries that may occur off the West Coast Region:

- **Black Abalone** (*Haliotis cracherodii*), throughout its range, endangered
- **White Abalone** (*Haliotis sorenseni*), throughout its range (California and Mexico),endangered
- Puget Sound distinct population segment, or DPS, of **bocaccio** (*Sebastes paucispinis*), endangered
- Puget Sound distinct population segment, or DPS, of **yelloweye rockfish** (*Sebastes ruberrimus*), threatened
- Southern distinct population segment, or DPS, of **eulachon (Columbia River smelt)** (*Thaleichthys pacificus*), threatened
- Southern distinct population segment, or DPS, of **North American green sturgeon** (*Acipenser medirostris*), threatened
- Eastern Pacific distinct population segment, or DPS, of **Scalloped hammerhead shark** (*Sphyrna lewini*), throughout its range, endangered
- **Gulf grouper** (*Mycteroperca jordani*), throughout its range, endangered

How do I?

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- **Learn more about ESA Section 7 consultations**
- **Learn more about the Pacific Coastal Salmon Recovery Fund**
- **Log into my IFQ account**
- **Find a biological opinion**
- **Report a stranded or entangled marine mammal**
- **Report a violation**
- **Find grant opportunities**

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West Coast Region Home » Marine Mammals



ESA-Listed Marine Mammals

NOAA Fisheries has listed 22 species of marine mammals under the Endangered Species Act, where 8 of those species are from the West Coast. We manage 7 different species of cetaceans (listed below) and Guadalupe fur seals. NOAA Fisheries' [Alaska Region](#) manages Steller sea lions. The Alaska Fisheries Science Center's [Marine Mammal Laboratory does research on Steller sea lions](#).

[Blue Whales](#)

[Fin Whales](#)

[Guadalupe Fur Seals](#)

Central America [Humpback Whale](#) DPS * change in status, endangered as of October 2016

Mexico [Humpback Whale](#) DPS * change in status, threatened as of October 2016

[Northern Pacific Right Whales](#)

[Western North Pacific Gray Whales](#)

[Sei Whales](#)

[Southern Resident Killer Whales](#)

[Sperm Whales](#)

[Steller Sea Lions](#) * change in status, *delisted* as of December 2013

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